Physician Manpower Planning: Lessons from the Macdonald Report

Jonathan Lomas
Morris L. Barer
Greg L. Stoddart

Discussion Paper Series

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Preface

In late 1981, two of us (JL and GLS) were asked to prepare a series of background papers on physician-manpower planning for the education and edification of the Council of Ontario Universities' Task Force on Medical Manpower. This Task Force ran parallel with the first phase of the Ontario Council of Health's Macdonald Task Force – the second (broader) phase of which is the object of our present attention. We took the opportunity to familiarize ourselves with the process of physician-manpower planning in Canada, produced three background papers (Lomas and Stoddart 1982a, 1982b, 1982c), and thus became intrigued by the challenges inherent in forecasting and planning the health system's future need for physicians. Some of these challenges had already been confronted by the third member of our team (MLB) in his role as Associate Director at the University of British Columbia's Health Manpower Research Unit, and in being an observer at various meetings of the Federal-Provincial Advisory Committee on Health Manpower. We therefore pooled our respective thoughts on the subject to publish a critique of Canada's historical approach to physician-manpower planning in a recently completed article (Lomas, Stoddart, and Barer 1985).

By the time the Report of the Macdonald Task Force was released in May 1983, therefore, we were well steeped in the complexities and exigencies of trying to arrive at policies on the appropriate size and growth rate of the physician stock. We were disappointed to discover that the Report continued Canada's historical approach to the problem – an approach about which we had already raised some serious questions. The opportunity to explore the issue further, with specific illustrations from a well-documented Ontario exercise, was generously provided by the Ontario Economic Council. This discussion paper is the result of that opportunity.

The Macdonald Report (reviewed in Chapter 2) is Ontario's most comprehensive study in the 1980s on future physician requirements, and, because it was done under the auspices of the senior advisory body to the Minister of Health (the Ontario Council of Health), it had the potential to be extremely influential in the development of the province's manpower policies. This potential was not realized. This study is, for the most part, an analysis (Chapters 3 to 5) of why this was the case – with respect to both the methods employed by the Task Force and the policy framework that it adopted. Our analysis is highly critical, and, having completed this first public critique of the Macdonald Report, we feel that it provides ample justification for the less-than-warm reception that the report received inside the Ministry of Health. Readers of the current study may also come away with a better understanding of why we have simultaneous (and apparently contradictory) debates in manpower policy and manpower planning. In the former, the discussion centres on which medical schools to close or by what percentage to reduce medical-school enrolment, whereas, in the latter, the formal exercises continue to recommend further increases in the current size of the physician stock.

There are some who may ask why, given that it has been at least partly done before, it is still important to be discussing the shortcomings of our present methods for planning the future physician requirement. The answer is that as long as we continue to witness both provincial and federal exercises that employ the method used by the Macdonald Task Force, we should be concerned to point out the shortcomings and limitations of that method in the hope that future requirements planning will profit from the critique, and either avoid wasting the resources to fund such a method or provide enough resources and time to do the job properly.

Those who doubt the relevance of our critique of present approaches to physician-manpower planning have merely to glance at the methods employed in the most recent federal-provincial report in the area (Canada 1984) to be convinced otherwise. And those who may consider the output of such exercises to be harmless and largely ignored should note the recent endorsement of the Macdonald Report by the Bovey Commission on the future of Ontario's universities

(Ontario 1984): 'In the opinion of the Commission, the conclusions and recommendations of the Ontario Council of Health [Macdonald Report] ... remain valid for at least the immediate future' (p. 11). We hope that the technical details of Chapters 2 through 4 of this study lay to rest any further claims of the internal validity of the Macdonald Report. Furthermore, Chapters 1, 5, and 6 raise equally serious questions about the policy relevance of these types of physician-manpower planning exercises. We have tried to provide a comprehensive summary of the shortcomings in present physician-manpower planning, combining previous criticisms of the chosen methods with our own thoughts provoked by the Macdonald Report. This book should therefore be of interest to those in government, universities, and professional associations involved in manpower planning, as well as to students and teachers of health economics, administration, and planning.

To set what is therefore primarily a critique of the Macdonald Report in context, we found it necessary to provide – in Chapter 1 – what is to our knowledge the first historical review of physician-manpower policy development in Ontario from the introduction of full universal health insurance in 1969 to the present day. This chapter should be of interest to anyone who has concerns about how government is discharging its dual responsibility to guide our future health system's structure and to maintain fiscal solvency.

Finally, having reviewed much of the analysis and data upon which current policy is based, we took the opportunity to draw some limited conclusions on what we think is indicated for future planning exercises and future physician-manpower policy (Chapter 6). Since our major interest was in highlighting the problems inherent in the methods employed by the Macdonald Task Force, we do not consider the policy lessons to be comprehensive; they are, however, the lessons that we found hard to ignore after looking in detail at the current poor relationship between the available evidence on physician requirements and the prevailing policies. This chapter can be treated as a consolidation of the key points in the study, with some additions that reflect our growing concerns about how far our current health care system is from efficient operation (Stoddart 1985).

What we raise in the ensuing pages are serious questions about how our current planning fails to incorporate consideration of this efficiency objective. We do not promise to provide the reader with a blueprint for action; but we hope that what we have provided is the synthesis upon which such a blueprint can be based.

Physician-Manpower Planning: Lessons from the Macdonald Report

1

Preview: the origins and context of the Macdonald Report

This chapter first traces the changes in policy approaches to medical-manpower planning over the last fifteen years. The move from an earlier concern about undersupply of physicians to the current concern about oversupply is described. We note that potential policy responses to oversupply are both slower to be implemented than were those for undersupply and seem to require a greater weight of justificatory evidence. Three important influences on the changes in the physician-manpower policy environment are isolated: the demonstration of a link between physician numbers and total health care expenditure, the realization that there are severe limits on medical care's potential contribution to the population's health, and the emergence of lesser trained but equally competent substitutes for physicians in many areas of practice. We then describe a number of methodologic approaches available for physician-manpower planning, place the Macdonald Report and previous planning exercises in this context, and note that none has chosen a methodologic approach that would enable it to take account of the important new influences on the policy environment. Finally, we provide a road map for the remaining chapters, which review the Macdonald Report, address the issues of its methodologic approach, analyse its measurement accuracy, assess its policy relevance, and draw out concluding methodologic and policy lessons.

THE POLICY CONTEXT

The Macdonald Report, *Medical Manpower for Ontario* (Ontario Council of Health 1983), was by no means the first venture into the field of physician-manpower planning for Canada, for Ontario, or even for the Ontario Council of Health (OCH) (under whose auspices the report was prepared). As early as 1964, Judek (1964) analysed physician manpower for the first Hall Royal Commission on Canada's national health program. Until the early 1970s (following the introduction of universal medical insurance across the country), the primary concern was how to ensure that there would be enough physicians to serve the expected increase in demand. Relatively unfettered physician immigration policies were adopted, four new medical schools were built to provide future self-sufficiency in physician supply, and Canada forged into the 1970s with an average yearly increase of 4.8 per cent in the physician supply between 1968 and 1975, 3.3 per cent faster than general population growth (Health and Welfare Canada 1976).[1] In that same period, the number graduating from Canadian medical schools increased 50 per cent from about 1,000 to over 1,500 per year (Health and Welfare Canada 1976).

By 1975, however, this physician boom was beginning to cause concern. Echoing sentiments expressed earlier in the United States (Ginzberg 1969), commentators questioned and debated whether Canada might have too many doctors (Evans 1972; Evans 1976; Brown 1977). The concern was tied to a hypothesized link between physician numbers and health-care costs, attributable to the apparent ability of physicians to influence the utilization rates for their own (and others') services (Evans 1972; Fuchs and Kramer 1972; Evans and Wolfson 1978). With almost sole responsibility for the funding of physicians' services, governments were quick to initiate investigations and evaluations, but encountered difficulties in implementing policy changes. The problem was that, whereas policies designed to increase the physician supply had been relatively clear-cut and politically painless, effective policies for moderating or actually reducing supply tend to be, if not conceptually more elusive, politically less tasteful. Empirical support for policies aimed at lowering physician production became far more important than was ever the case for policies designed to boost production.

Physician-manpower studies – the first wave

Thus were spawned a flurry of physician-manpower studies. At the federal level, an aggregate-supply projection by Health and Welfare in 1974 (Aziz 1974) prefaced a major initiative in 1975 to look at physician requirements by specialty under the auspices of the National Committee on Physician Manpower. In Ontario, the Council of Health entered the fray in 1974 (OCH 1974), and was quickly followed in 1975 by the medical schools' answer under the umbrella of the Council of Ontario Faculties of Medicine (COFM 1975). None of the reports sounded clarion calls to cut back supply; on the contrary, they all warned against overly hasty and ill-considered actions that governments might regret in the future. One new emphasis that emerged was the distributional question, both geographic and by specialty. The justification for not cutting back production was the danger of indiscriminate effects on the supply of various specialties. The justification for continuing modest increases in supply was the poor geographic distribution of physicians. This could be solved, it was argued, by having enough physicians to ensure that some were willing to serve in the under-doctored areas – the 'over-flowing pot' market solution to geographic maldistribution (Williams et al. 1983).

In the face of these equivocal recommendations, governments took the path of least political resistance to moderate the rapid increase in physician supply. Agreements were made between the federal government and the provinces in 1975 to restrict immigration. The number of Canadian medical-school graduates finally stabilized at around the 1976 level of just over 1,700 (Ryten 1984a). The Ontario government recognized the difficulties of proceeding any more rapidly than this, and in 1975 issued policy 'guidelines' that set the desired physician-to-population ratio at 1:585 (the ratio in existence that year according to the College of Physicians and Surgeons' register), and the general practitioner-to-specialist ratio at 55:45. At the time, however, few in the health care system knew of the existence of these guidelines.

Thus, government concern about physician oversupply in the mid-1970s did not find support in the conclusions of the reports of the time. Even if this had not been the case, it is questionable whether governments would have been ready to take aggressive measures over physician manpower; without the ally of unequivocal recommendations, no more than restrictions on immigration were implemented. A broader approach to physician manpower that recognized three factors heretofore ignored, or not explicitly addressed, however, was beginning to be formulated.

The first of these factors was a recognition that there was no magic level of physician supply that, once achieved, would automatically alleviate all unmet needs. This view of physicians (indeed, of all health resources) had been promulgated by Beveridge in the 1940s (Beveridge 1942) when he had introduced the British National Health

Service under the belief that resource commitment to the service would decline after a few years as unmet health needs received attention and therefore no longer required care. Instead, resource commitments showed no signs of decline and even increased. By the mid-1970s, Canadian governments were beginning to accept the notion that physicians, with their ability to influence the utilization of their own services, as well as of complementary resources such as hospitals and pharmaceuticals, were a major and significant determinant of the resources consumed in the health care system. The corollary of this of course was that control over health-care expenditures could at least be partly managed by control over physician numbers.

The second factor that entered policy deliberations was the health-field concept first put forward publicly, by the federal government, in 1974 – *A New Perspective on the Health of Canadians* (Lalonde 1974). That more than just medical care influenced our health was an idea that had a distinguished past, dating at least back to playwright George Bernard Shaw (1911). More recent articulations include those of academic Thomas McKeown (1979) and social critic Ivan Illich (1976). In drawing attention to the roles of lifestyle, environment, and health-care organization in determining levels of health, Lalonde's *A New Perspective* questioned the appropriateness of the current health-budget allocations – primarily to acute-care hospitals and physicians. Here was a further reason to consider whether additional physicians were really necessary, or whether the resources could be better used if diverted to other parts of the health field.

The third factor was the demonstration that health workers without the six or more years' training of physicians could handle many of the common health problems of the population. This was most widely demonstrated for nurse practitioners, but was no less true for other potential substitute personnel such as dental auxiliaries or pharmacy assistants (Spitzer 1978). This potential for alterations in the personnel mix of the health manpower pool could clearly reduce the requirement for physicians.

Unfortunately, none of these factors was considered by the authors of the various physician-manpower reports in formulating their recommendations for policy. The methodologies that they employed failed to recognize either substitution or physician-induced utilization potential, as exemplified by the National Committee's use of extrapolated levels of 1973 utilization to justify requirements in the 1980s (Canada 1975). Furthermore, the Lalonde thesis generally went unheeded when the reporting committees (usually physician dominated) concentrated only on the medical-care (as in physician) portion of the health care field in calculating future health care requirements. Governments therefore exhibited increasing discomfort as they received reports that led them away from their desire to control expenditures via physician numbers, and that provided no assistance in the search for cost-effective alternatives to health levels achieved through physician-delivered medical care.

Thus it was that physician supply continued to increase, albeit at a slower rate than the early 1970s, but still faster than population growth. Between 1975 and 1980, physician numbers grew an average 2.5 per cent per year while population growth slowed, to about 1.0 per cent a year (Health and Welfare Canada 1981). This continued relative growth in the physician supply was reflected in a 10 per cent per annum increase in physician-service expenditures per capita. Over the same period (1975-80), physicians' fees rose 7.6 per cent per year (Barer and Evans 1985). Growth in the per capita utilization rate had also slowed compared to the early 1970s, but was still averaging 2.3 per cent each year. This continued growth in what were (and are) essentially open-ended programs (from a cost perspective) began to come up hard against the emerging importance of public-sector fiscal restraint in most provinces. The three factors noted above became paramount as the inconsistency of open-ended programs in an environment of fiscal control was driven home. The result was considerable background activity, both provincial and federal, by committees of senior civil servants attempting to co-ordinate appropriate policy.

The 'Hall Review' and the second wave

It was not, however, until the release of the second Hall Report, in 1980 (Hall 1980) – *Canada's National-Provincial Health Program for the 1980s* – that the process 're-formalized' with a new round of task forces and committee reports on physician manpower. In his report, Hall isolated the potential for physician oversupply as an issue of primary concern and recommended a medical-manpower survey. He stated:

> The present ratio, Canada-wide, is one physician to 666 citizens ... If present recruitment into the profession continues, that ratio may well be one physician to 300[2] citizens by the year 2000. Such a ratio would create a situation whereby it would be impossible for a Province to support the number of physicians who would be looking for the income that physicians in an area with a much higher [sic] ratio of physicians to population would be receiving. Concern that some areas or cities in Canada may now be approaching an over-supply situation is not wholly unknown today. (p. 34)

Although Hall may have overstated the case, his was perhaps the first publicly commissioned national report to address the issue of physician manpower in the context of the link between physician numbers and health-care expenditures.

The response at the federal level was to appoint a special committee on physician manpower, reporting to the Deputy Ministers of Health, which subsequently recommended a 10 per cent reduction in medical-school enrolment (Waugh 1981). Activity followed quickly in the provinces as well. The four western provinces engaged Peat-Marwick to do a large-scale study of western health manpower. Its report recommended that medical-school enrolment should be cut by 25 to 30 per cent (Peat-Marwick and Partners 1982). The British Columbia Joint Committee on Medical Manpower recommended, also in 1982, that adjustment of medical-school enrolment be given serious consideration as one of a number of possible measures for controlling physician supply. In Quebec, an analysis of physician requirements led to a cutback in residency posts to increase the supply of general practitioners relative to specialists.

In Ontario, the first formal report of the 1980s – the Low Report (COFM 1981) – was released by the Council of Ontario Faculties of Medicine in response to the government's request for advice on the appropriate distribution of residency posts. The report was concerned with policies for postgraduate manpower,[3] and concluded that Ontario required an increase of 693 physicians to the 1980 stock, distributed across the specialties such that specialist numbers would be increased relative to general practitioners. The methodology adopted by this report once again based future requirements on acceptance of current levels of physician utilization. Its methods also failed to take account of alternatives to physician-delivered medical care or the appropriateness of current utilization patterns. Indeed, the report stated that 'Graduate Medical Education should maintain the perceived physician requirement for the reference year (1980)' (COFM 1981, p. 1).

The report was received by the Ontario Ministry of Health, which immediately reminded COFM that 'the original request was for advice on the allocation of posts *within* the global number of posts available' (Medical Manpower Advisory Committee 1981, emphasis added). It was hardly surprising that the report did not receive a warm welcome in the Ministry. Far from considering increasing the number of residency posts, the Minister of Health had already signalled his intention in the fall of 1980 to reduce the number of Ministry-funded postgraduate places in medical schools by 2 per cent on 1 July 1981, and a further 5 per cent in each of the next three years. On receiving the Low Report, he did agree to postpone the first cuts to 1 July 1982 to allow time for review of the report.

The indications from almost all other directions, however, pointed to a policy of reductions in physician numbers. In March 1981, the independent chairman of the Joint Committee on Physicians' Compensation for Professional Services (the committee that negotiates fee levels between the Ontario government and physicians), Paul Weiler, called on the government and the profession to tackle the combined problems of increasing utilization and increasing physician numbers (Weiler 1981).[4] Also, in 1981, the Minister of Health, Dennis Timbrell, stated publicly that

> although the demand for and cost of health care are escalating, the public purse from which costs must be paid is strained ... Between 1974-75 and 1979-80, the volume of physicians' services increased by 20 percent. Two forces impelled this increase. The number of physicians practicing in the province rose by 13 percent. In addition, the average number of services provided per physician shot up by a further six percent ... There are fairly uncomplicated, though admittedly painful, ways to control the supply of doctors, such as limiting enrolment in medical schools. (Timbrell 1981a, pp. 15-16).

What in the mid-1970s was largely private recognition of the link between health-care costs and physician numbers had decidedly become public 'fact' by the 1980s.

Consideration of substitutes for physicians was also evidently on the government's policy agenda. In a letter to the Chairman of COFM at the end of 1981, the Minister pointed out that 'economists and health planners state that other health workers have not been utilized to their full potential. These points may be argued but they must be taken into account' (Timbrell 1981b).

Rejection of the Low Report was almost a foregone conclusion. In June 1981, the Minister of Health explained to the Chairman of COFM why the report was unacceptable:

> A fundamental problem is that [your] Committee has not dealt explicitly with the policy guidelines set out by government, namely, a physician/population ratio of 1:585 and a proportion of specialists to non-specialists of 45% : 55%. The recommendations therefore appear to conflict with the policies given and to be outside of the terms of reference expected. (Timbrell 1981c)

The Macdonald Report

From these ashes rose the Macdonald Report. The Minister, presumably perturbed at the conflicting policy advice he was receiving, referred the entire matter to the Ontario Council of Health in June 1981. In his letter of referral to the Chairman of the Council, he first explained the Ministry's reasons for rejecting the Low Report, and then went on to say: 'I would appreciate the advice of the Clinical Education Committee of the Ontario Council of Health on the problems addressed by the Report, and faced by government, concerning medical manpower requirements and postgraduate education in Ontario' (Timbrell 1981d). He then proceeded to emphasize the government's interest in the factors that had become so clearly identified with physician-requirements planning – health-care costs and alternatives to physician-delivered medical care:

> Government has accepted the need to control the form and rate of economic growth in the 1980s ... There is a recognized need to encourage cost-effective evolution of the [health care] system. The use and mix of allied health manpower and the appropriate introduction of new technology in health procedures and equipment, are obvious options to be explored.

Finally, he provided an enviably (or some might say unenviably) wide mandate for the Council's deliberations: 'The Committee and Council should feel free to explore and comment on all issues relevant to manpower planning.'

The Council appointed a special Medical Manpower Task Force under the chairmanship of J.B. Macdonald, and established its terms of reference. The Council was sensitive to the immediate needs of the Minister and, 'recognizing that the Minister's most pressing need was for advice on the postgraduate training establishment, it asked the Task Force to deal with its tasks in reverse order, looking at the narrower issue first (Phase I) and only later examining medical manpower in the broader context (Phase II)' (OCH 1983, p. 5). The Macdonald Task Force was therefore given until February 1982 to report on the issue of reductions in medical-school postgraduate posts planned for July 1982 (Phase I), and until February 1983 to complete the broader Phase II.

Almost simultaneously, the Council of Ontario Universities, the parent body of the Low Report's authors (COFM), appointed a parallel Task Force to consider the broad policy issues involved in medical education and physician manpower (COU 1982). This Task Force was also due to report in early 1982, at the time of the Macdonald Phase I report.

The process adopted by the Macdonald Task Force, the methodology it chose, and the conclusions it came to are dealt with in detail later in this monograph. In general, the Task Force adopted a similar methodology and came to similar conclusions to those of its predecessor reports in Ontario (and elsewhere in Canada) on physician manpower. Neither the cost repercussions of an increasing physician supply nor the effects on requirements of alternatives to physician-delivered medical care was quantified. The Task Force's recommendations to the Minister of Health certainly did not address the type of concern expressed by Hall (1980) or Weiler (1981) in their recent analyses of the health care system. On the contrary, the recommendations of Phase II, released in May 1983, supported continued expansion of the physician supply and no changes to the existing balance of resources in the health care system.

Phase I, on postgraduate medical training, was a slightly different matter. The recommendations at this stage were considered interim until completion of Phase II. As the Task Force stated in its Phase II report, 'These [the Phase I recommendations] were done in the light of the data and projections available at the time, but the intention was to examine questions of supply and demand more thoroughly in the final report' (OCH 1983, p. 48). Although the Task Force's Phase II recommendations partially reversed the conclusion, they reported with an initial conclusion in early 1982 that supported 'the Minister's proposed reduction of funded places to a total of 2,077 by 1985 ... We find no cause in relation to the desirable size of the postgraduate training program to reject the Minister's proposed total reduction' (OCH 1983, p. 114).

The response of the Ministry of Health to these two sets of recommendations was in the one case perverse (Phase I), and in the other case predictable (Phase II). Following the Task Force's Phase I support for cuts to postgraduate training posts, the Ministry, now under a new Minister of Health, actually allowed reinstatement of the 125 posts slated for reduction in 1982, as long as they were applied to designated specialty areas thought to be in short supply. It was soon after this that the further cuts in 1983, 1984, and 1985 were also cancelled. It is not easy to explain this apparent reversal of policy direction by the government once it had in hand the long-awaited external support for its desired policy of reducing the supply of postgraduate posts. Perhaps the transition to a new Minister of Health, still unfamiliar with the portfolio, was one factor. Perhaps the Ministry yielded to pressure from COFM, which had, not surprisingly, warned of potential adverse effects on patient care in teaching hospitals (OCH 1983, p. 136). Finally, it might have been a recognition that alterations to the physician supply were not optimally approached by starting at the postgraduate end of the production spectrum. A restriction on residency posts has little effect on total physician numbers; it merely alters the balance between specialists and general practitioners. Effects on total physician numbers come from reduced undergraduate places in medical schools (although even then only after a certain lag), or changes in immigration policy.

The final Macdonald Report, recommending increased physician supply, was released in May 1983. By then, the Minister of Health was no longer new, and he reacted predictably to the call for more physicians. Internally, the Ministry prepared lengthy critiques of the Report, while publicly the Minister, before the report was formally released, made clear that he was rejecting its conclusions (*Globe and*

Mail 1982). Once again, the government was in a position of receiving no support for domestic policies directed at reducing physician supply.

In the wake of the Macdonald Report

Following the Macdonald Report, however, there was a growing consensus within other governments and academic circles that controls should be placed on the size of the physician stock, although voices could be heard on both sides of the debate. Quebec had already limited specialist numbers by requiring individual hospitals to establish quotas for each specialty. In 1982, it had instigated the use of both carrots and sticks as incentives for better geographic distribution of physicians when Bill 27 empowered the government to set limits on the supply of physicians in the major urban areas. Practitioners included on the set lists received fees at the full negotiated level. Other practitioners received discounted fees for practising in areas with full establishments, but enhanced fees for locating in underserviced areas. Finally, in 1983/4, there was an across-the-board cut of 10 per cent in undergraduate medical-school enrolment.

In British Columbia, undergraduate enrolment was increased in the province's only medical school in the fall of 1982, based on the not unreasonable desire to move B.C. toward the provincial norm in terms of medical-school opportunities per capita. Of course, increasing local production was unlikely to slow the flow through and over the mountain passes into the province with already the highest physician-to-population ratio. In 1983, a bill was introduced that would empower the province to restrict new physicians' access to the provincial medical insurance program (Government of British Columbia 1983). Some legislative manœuvring and a court case later, this re-appeared in slightly different form but with the same basic intent (Legislative Assembly of British Columbia, 1985). In concert, these two apparently contradictory policies may in the longer run achieve control of absolute numbers while improving opportunities to practise medicine for B.C. residents.

In the wake of the Macdonald Report, individual voices have been heard calling for reduced physician production. During the recent Commons Committee hearings on the *Canada Health Act*, one health economist called for the closure of Queen's medical school in Ontario (*Globe and Mail* 1984). At a national conference on managing Canada's health-care system in the summer of 1983, a professor of medicine, and vice-provost, of McGill University suggested that 'in a moment of great courage, which I might add is rarely displayed by governments at any level, or by university administrators in any context, it might be agreed to close completely at least two of the less viable Canadian medical schools' (Freedman 1983, p. 10). (McGill was presumably not considered one of the 'less viable Canadian medical schools'!)

At the same time, the broader issue of system restructuring was receiving some attention. The potential effects of altering the incentives present in the health care system (via structural reform) became a factor in discussions of the future requirement for physicians (COU 1982; Lomas and Stoddart 1982c; Stoddart 1985; Lomas and Stoddart 1985). Altered incentives in the health care system emerged as a major issue in Ontario following its identification as a priority by participants in a series of innovative consultative conferences held in 1982-3 between health-ministry personnel, health-system providers, and analysts (Ontario Ministry of Health 1984).[5] In some cases, the suggestion has been that requirements for physicians would be reduced as a consequence of altered incentives (Lomas and Stoddart 1985), whereas in other instances, the effects are less clear (Lomas and Stoddart 1982c; Stoddart 1985). The Council of Ontario Universities Task Force (started simultaneously with the Macdonald Task Force) explored the issue thoroughly, and its report recommended strongly against reducing physician production (COU 1982).

If one could identify a stand taken by the medical associations through all this, it would most probably be for the postponement of decisions regarding medical school size pending the availability of better data (Woods 1983). Consistent with this philosophy, the Canadian Medical Association has been compiling a physician-manpower data bank – an initiative that has received mixed reactions from the medical profession. There is some recent evidence, however, that private sentiments favour a slowing in the growth of physician supply (Waugh 1985).

There is little doubt that governments, given a politically neutral implementation environment, would like to achieve at least stabilization, if not outright reduction, in the size of the physician stock. There has also been a growing body of opinion and evidence, some described above, in both academic and government circles to support the wisdom of this approach; and some western European countries have recently taken the steps only being contemplated in Canada (Schroeder 1984). The public debate still continues as to the merits of moderated or reduced physician supply, however; and formally commissioned reports on future physician requirements, such as the Macdonald Report, continue to turn up conclusions that are at odds with the desired policy direction. Conclusions, however, are only as good as the methodologies used to produce them, and there has been a distinct uniformity in the methodologies adopted by these commissioned studies; the Macdonald Task Force was no exception. The next section places the Macdonald Report in this methodologic context.

THE METHODOLOGIC CONTEXT

Physician manpower planning has two primary components – establishing current and future supply, and calculating requirements. The major methodologic questions relate to the process for establishing requirements; supply calculations present data-source and accuracy problems, but few methodologic choice problems. The difficulties, and the disappointing results of manpower exercises attributable to them, have been recognized and discussed in detail by many commentators (Lave, Lave, and Leinhardt 1975; Reinhardt 1975; Jacoby 1978; Maynard and Walker 1978; Bloom and Peterson 1979; Lomas, Stoddart, and Barer 1985). The primary methodologic choice for the 'requirements' phase has been characterized as a choice between only two routes – using need or using demand for health services to determine future requirements (Jacoby 1978). The need-based approach should focus on the actual incidence of disease in the population and translate it into the physician numbers required to address the revealed quantity and nature of the disease incidence. Although it is commonly identified as the approach in which future potential modifications to the health care system are considered, this is not a necessary accompaniment. From a policy perspective, it is an approach that parallels the view that physicians are required for care in all situations likely to benefit from physicians' services, which are not necessarily all the situations in which care is demanded or currently utilized.

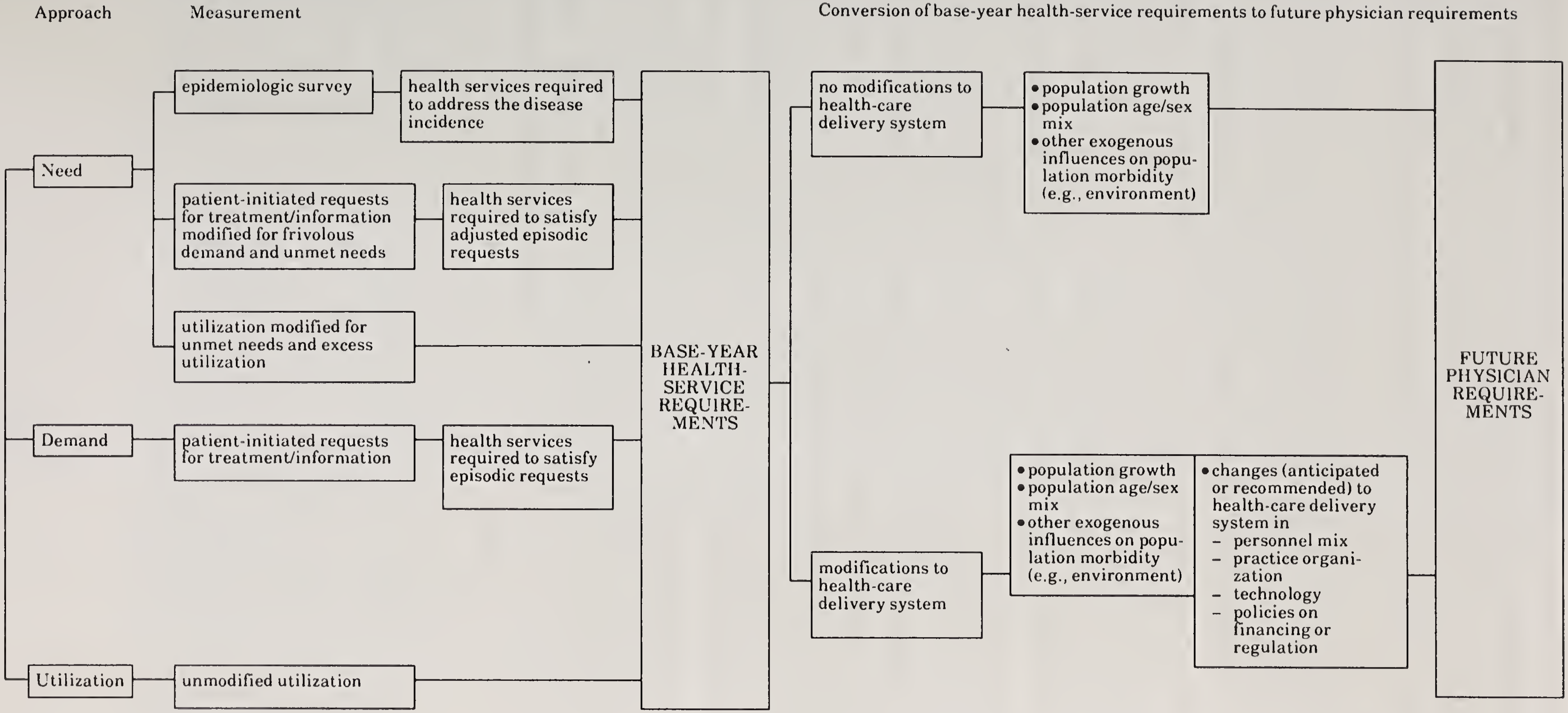
The demand-based approach, in contrast, should focus on the quantity of health care services demanded by the population, and calculate physician requirements based on the number and nature of these patient-initiated episodes of care. Although this approach is commonly identified with retention of current delivery-system arrangements, this is again a false presumption – final requirements under a demand-based methodology *could* reflect potential modifications to the delivery system. Demand-based analyses most appropriately parallel policy perspectives that hold that physicians are required for all situations in which care is demanded, whether or not there is demonstrated need for the care.

There is a third possibility for health-manpower planning, however, that, although rarely explicitly recognized as having been the chosen approach, has consistently turned out to be the route actually taken by Canadian studies. This methodologic option is the utilization-based approach. The focus in this case is upon the health care services actually being utilized currently and the translation of this into a required number of physicians. Again, future potential changes in the delivery system may or may not be taken into account. The policy perspective of this approach is that the future physician requirement must be able to match the quantity of services currently provided (on a per capita basis) whether or not they are all needed and whether or not they are all patient-initiated.

The attractiveness of utilization-based analysis lies in the ready availability of utilization data, in sharp contrast to the unavailability of direct measures of either need or demand for health care services. Instead of addressing this measurement problem explicitly, however, manpower planning historically has taken the simple but misleading route of adopting utilization as a proxy for either 'need' or 'demand' without recognizing the implications for its policy perspective and, we might add, without making appropriate modifications to the utilization data to better enable them to proxy either need or demand.

Figure 1 describes, under the headings of 'Approach' and 'Measurement,' these important distinctions. For each approach – need, demand, or utilization – we outline the potential ways of measuring the health-service requirement; all three are separate and distinguishable, and the measurement task is different for each. A third column in the figure outlines the choice of whether or not to incorporate into the exercise modifications in the arrangements for organizing, financing, and delivering health care, i.e., to look at the potential for translating the health-service requirements into patterns of health-care delivery that do not necessarily mirror the current deployment of resources. This distinction is expanded upon in

FIGURE 1
Methodologic and measurement choices for estimating future physician requirement


Approach
Measurement
Conversion of base-year health-service requirements to future physician requirements
Need
Demand
Utilization
epidemiologic survey
health services required to address the disease incidence
patient-initiated requests for treatment/information modified for frivolous demand and unmet needs
health services required to satisfy adjusted episodic requests
utilization modified for unmet needs and excess utilization
patient-initiated requests for treatment/information
health services required to satisfy episodic requests
unmodified utilization
BASE-YEAR HEALTH-SERVICE REQUIREMENTS
no modifications to health-care delivery system
• population growth
• population age/sex mix
• other exogenous influences on population morbidity (e.g., environment)
modifications to health-care delivery system
• population growth
• population age/sex mix
• other exogenous influences on population morbidity (e.g., environment)
• changes (anticipated or recommended) to health-care delivery system in
– personnel mix
– practice organization
– technology
– policies on financing or regulation
FUTURE PHYSICIAN REQUIREMENTS

the right side of Figure 1, which shows that although health-service requirements will potentially change because of future demographics, planners may choose whether or not to respond to anticipated future requirements (or indeed current requirements) by altering the organization, financing, or delivery arrangements (e.g., by introducing nurse practitioners).

Although the label (need or demand) attached to their deliberations has varied, Canadian planners have, despite this, invariably taken the route of measuring requirements via unmodified utilization and choosing not to include potential changes in delivery arrangements into requirements estimation. Canada's first major national study (Canada 1975), although it used utilization data, stated that it was a need-based approach because 'by analysis of utilization data an indicator of the current volume of perceived need ... could be derived for most of the clinical specialties' (p. 26). We hope that Figure 1 clarifies the inappropriateness of this assumption. The recent Low Report (COFM 1981) of Ontario did not label itself; but, by adopting as a goal the maintenance of 'the perceived physician requirement for the reference year (1980)' (p. 1), it was clearly adopting the policy perspective of the utilization-based approach wherein the current requirement is determined directly by current levels of service provision. Neither exercise chose to consider potential modifications to delivery arrangements that might reduce the requirement for physicians. Indeed, the Low Report stated that 'new developments' should not be included in the planning process until 'approved by an independent planning body' (COFM Postgraduate Manpower Committee 1981, p. 1).

While the utilization-based approach flourished in Canada, the United States embarked in the late 1970s on the more challenging need-based approach. The Graduate Medical Education National Advisory Committee's (GMENAC's) study (United States 1980) used epidemiologic survey data and delphi judgements to measure the health-service requirements for 1990; and it incorporated a number of potential changes in delivery arrangements into the process of translating health-service requirements into physician requirements. Although there has been some criticism of specific aspects of the GMENAC study in the United States (Reinhardt 1981; Peterson and Rodin 1983), it has been (unlike similar Canadian exercises) widely cited as the basis for physician manpower planning in that country, and has spawned further quantitative work (Bowman et al. 1983). It is particularly intriguing to note that this lone example of a true need-based approach to recent physician manpower planning stands also as a lonely example of an exercise that arrived at the conclusion of a physician surplus, at least in the future if not in the present!

These three exercises were, then, the primary examples of the available methodologies for the Macdonald Task Force when it embarked on its deliberations in 1982. The exact details of how the Task Force arrived at its final methodologic choices are reserved for discussion in the succeeding chapters; however, the overall theme of these choices was the selection of the path of least resistance through Figure 1. The Task Force stated that it chose a demand-based approach, but, like its Canadian forerunners, it used unmodified utilization data as a measurement proxy, thus negating the stated approach and placing it firmly on the utilization route. No potential modifications to the organization, financing, or delivery of health care services were considered in the quantitative estimates, and changes in health-service requirements took account of only population growth and population age/sex mix. A summary of the resulting report and recommendations, with particular attention to the re-translation of the terms of reference implied by its methodologic choices, is detailed in the next chapter. Throughout, when we refer to the 'Macdonald Report' or the 'Task Force Report', we mean the comprehensive final (Phase II) report. We refer to Phase I only insofar as we are led into it by the issues arising from the final report. We treat both the Ontario Council of Health's introduction and commentary to the report, and the consultant's (Arthur D. Little Inc.) study, in a similar fashion. We are, therefore, primarily concerned with Phase II (the final Macdonald Report) of the Ontario Council of Health (1983) publication *Medical Manpower for Ontario* (pp. 19-86).

Reader's guide to future chapters

In Chapter 3, we explore in depth the methodologic framework of Figure 1, i.e., the distinctions between the need, demand, and utilization approaches, and the consequent measurement issues for physician manpower planning. We highlight the confusion of the Task Force on these issues in choosing its utilization-based approach, and point out the repercussions of this confusion for what the Task Force chose to quantify and for its treatment of physician 'productivity'. In Chapter 4, we consider the specifics of the Task Force's actual quantitifed estimations. In this chapter, we critique the Report 'on its own terms' by accepting the methodology it chose, and concentrating only on the way in which data were selected and calculations were performed.

In Chapter 5, we analyse the policy implications of the Report, paying particular attention throughout to what we consider to be the lack of policy relevance of the Macdonald Report. By choosing the utilization-based approach, the Task Force placed itself in the policy context of maintaining (and even increasing) the current level of physician-service provision. Coupled with its failure to consider potential modifications to delivery arrangements, i.e., its failure to embed physician-manpower planning in the broader context of health-resource planning, this resulted in a failure of the Report to address the pressing and interesting policy issues that had been the original catalyst for the formation of the Task Force.

Chapters 3, 4, and 5 form the basis of our critique of the Macdonald Report, which can be stated as three themes running throughout our chapters – confusion between methodologic frameworks (Chapter 3), inaccuracy in quantified estimations (Chapter 4), and lack of policy relevance (Chapter 5).

In the final chapter, we draw out from our analysis of the Macdonald Report some lessons for future physician-manpower planning. We first discuss methodologic lessons for future studies, and, as a consequence of these methodologic lessons, we draw some conclusions on appropriate approaches given the current fiscal environment. Second, we draw policy lessons from the analysis to guide both future planning exercises and current physician-manpower policy. Foremost among these conclusions is the recommendation that if we can do no better than repeat the inappropriate utilization-based analyses of previous years, then we should stop funding physician-manpower-planning exercises.

If we are to move ahead in our approaches to physician-manpower planning, if we are to allow ourselves to incorporate factors such as the physician numbers/health care expenditures link, personnel-substitution, or the health-field concept into our planning, then we must critically examine the planning methodologies and policies that we have used in the past in order to build new methodologies and policies in the future. We hope that what follows makes a small contribution to that process.

2

Overview: a reader's guide to the terms of reference and final content of the Macdonald Report

The purposes of this chapter are two. First, and most basic, we provide a relatively uncritical description of the actual components and methodologic stages of the Task Force Report. Second, integrated into that review is a disproportionate emphasis on the details surrounding the terms of reference for the study – their source and original form, the deliberations and interactions that led to their modification, and the implications for the study and its policy relevance of the subsequently adopted modified terms of reference. It is with the second thrust, then, that we begin our critical look at the Task Force Report. We argue that the modification of the terms of reference obviated the Task Force's obligation to undertake its analyses with an eye to cost-effective future evolution of Ontario's health-care system. The resulting assumptions and analyses incorporate a built-in bias toward a finding of future physician shortage by a) taking as a point of departure an assumed equivalence of current (1980) supply and requirements, and b) building quantitatively onto that base only factors that will serve to increase requirements in the future. The results and policy recommendations are, accordingly, highly predictable.

INTRODUCTION

The Report of the Macdonald Task Force (Phase II) to the Ontario Council of Health, entitled *Medical Manpower for Ontario – A Policy Perspective* (OCH 1983), had terms of reference drawn up by the Council as follows:

> 1 To recommend appropriate objectives for medical-manpower policy taking into consideration the Government's purpose in controlling the form and rate of economic growth in

the 1980s, and its objective of cost-effective evolution of the health system.

2 To identify policy options for achieving and maintaining the recommended objectives.

3 To recommend appropriate policy options and appropriate methods of implementation. (p. 22)

These terms of reference were to be set within the context of:

1 Some consideration of the political and policy environment in which the study results would operate. For example, what are the likely external social values and economic conditions Ontario is likely to be facing, say in 1990 – eight years from now, as well as the internal values and arrangements expected in the health and medical care system?

2 The relationship of the medical manpower pool to such things as adequacy of medical services on the one hand, and cost on the other.

3 The role of incentives for cost-effectiveness and cost-benefit. The linkage between program and service decisions and responsibility for generating support funding.

4 The impact on medical services and costs of different modes of service delivery.

5 The effects of 'physician extenders'.

6 The effects of 'new technology'. (p. 6)

These terms were to take into account quantitative factors thought to be relevant, such as:

1 Population projections – numbers, age groups, ethnic make-up.

2 Physicians – age-and-sex distribution, attrition rates.

3 Physicians – population ratios – the bases for them, comparison with other jurisdictions, relationship between ratios, and various health and disease indices.

4 Women in practice.

5 Physician productivity.

6 Immigration/emigration/interprovincial migration.

7 Canadians studying outside Canada.

8 Education and licensing – health and content of programs, length of prelicensure training, sources and amounts of funding support.

9 Role of postgraduate trainees in hospital service, in teaching of undergraduates in medicine, and other health disciplines. (pp. 6-7)

The Task Force and its staff developed three parallel streams of activity toward meeting these terms of reference:

– A private consulting firm was engaged to undertake the major quantitative tasks, including the estimation of current and future supply and requirements under assumptions developed jointly by the Task Force and the consultants.

– Various individuals and organizations (listed in the Report) were consulted or invited to submit briefs.

– Project staff undertook literature reviews pertinent to factors affecting manpower requirements.

The Task Force itself was chaired by Dr. J.B. Macdonald, chairman of the Addiction Research Foundation. Its composition was a blend of legal, academic, and health care professional expertise. The research staff was comprised of a project manager (PhD), three research officers (MHSc, MSc), and a committee officer.

The Task Force engaged Arthur D. Little Inc. to provide a report on physician supply and demand in Ontario to the year 2001. This firm commenced work on its segment of the project in June 1982, and presented its final report in October of the same year. During its own deliberations, the Task Force called upon a number of resource persons, reviewed twenty-three written submissions, and heard five formal presentations (from the Ontario Chapter, College of Family Physicians of Canada; the Council of Ontario Faculties of Medicine; the Council of Ontario Universities; the Ontario Council of Administrators of Teaching Hospitals; and the Ontario Hospital Association).

The result of this process is a publication of the Ontario Council of Health, entitled *Medical Manpower for Ontario* (OCH 1983). It contains, in order of appearance, the covering Report of the Ontario Council of Health to the Minister of Health, the Phase II Macdonald Task Force Report, which is the primary focus of our present attention, the earlier Phase I Task Force Report on Postgraduate Training, and the Arthur D. Little Consultant's Report.

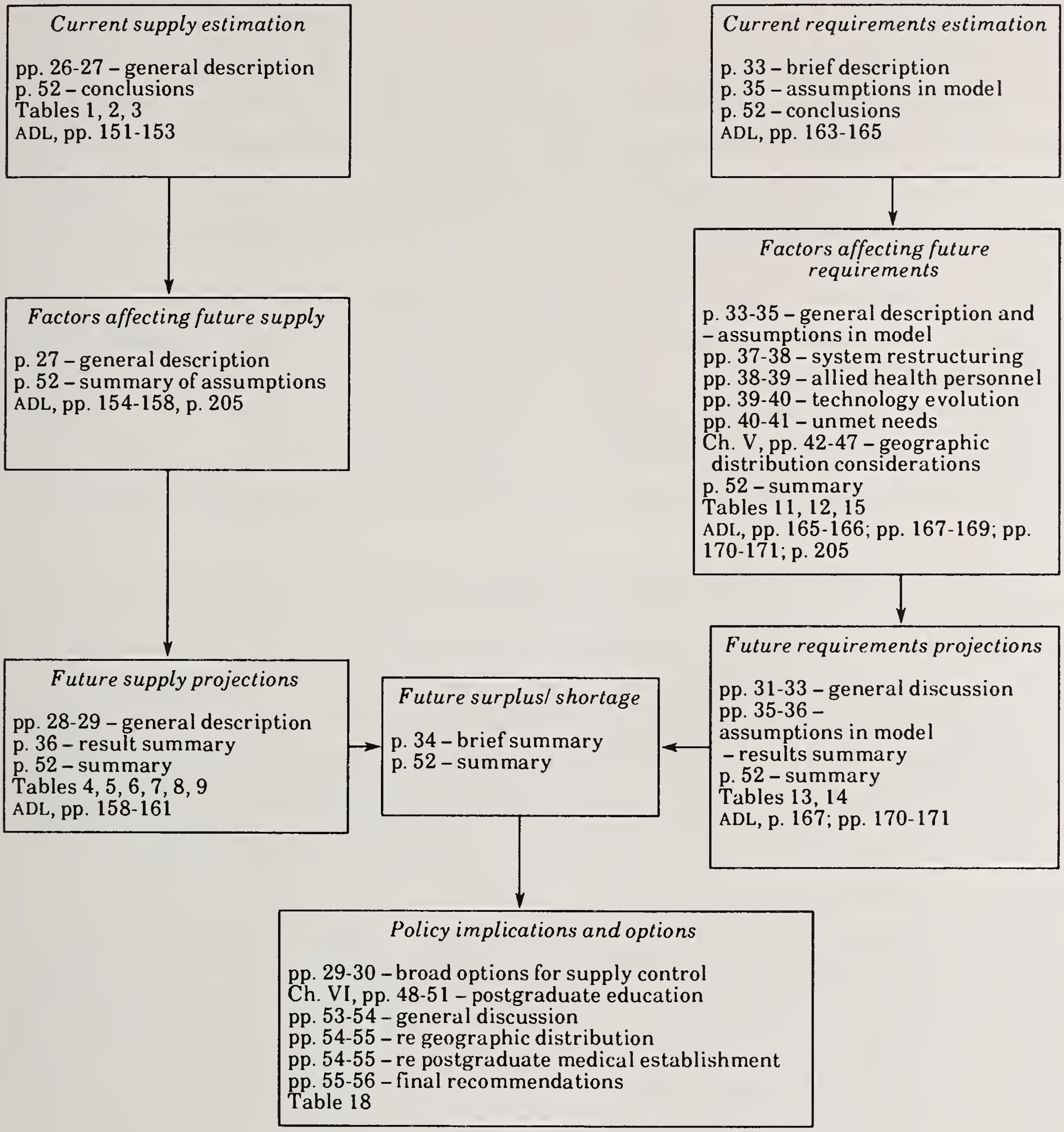
Figure 2 provides a guide to the Phase II Task Force Report. Not only is it a schematic framework representing the methodologic approach of the Task Force, but within each cell of that framework are the relevant page ranges from the Report. The figure may also be used for quick reference at various junctures in our detailed analysis in the following chapters. In this and the following chapters we refer to the chapters in the Task Force Report with Roman numerals – I, II, III, etc. – and our own chapters with Arabic numerals – 1, 2, 3, etc. – to more readily distinguish the two forms of reference for the reader.

The broad steps in the method represented by each cell are the standard steps one finds in most analyses of this type (Barer, Stark, and Kinnis 1984; Lomas, Stoddart, and Barer 1985). Current supply and requirements/needs/demand are each estimated; a roster of factors likely to affect each into the future is developed; and then each is projected forward taking some of those factors into account. The result of these parallel processes is an estimate (point or range) of future surpluses or shortages, from which come policy implications and directions.

THE TERMS OF REFERENCE

What are not included in Figure 2 are the first two chapters of the Report. These comprise a total of five pages. Chapter I contains a brief background description, and the terms of reference reproduced above. Chapter II sets the tone and context for the rest of the study, by discussing some of the issues and factors that had led to the formation of the Task Force. In setting about its work, the Task Force deliberated on two approaches to the first term of reference: 'to identify manpower requirements for a number of theoretical scenarios involving alternative roles for nurses and other health workers, alternative modes of delivery of care, and alternative payment policies

FIGURE 2
Macdonald Task Force Report, methodologic framework and layout


Current supply estimation
pp. 26-27 – general description
p. 52 – conclusions
Tables 1, 2, 3
ADL, pp. 151-153
Current requirements estimation
p. 33 – brief description
p. 35 – assumptions in model
p. 52 – conclusions
ADL, pp. 163-165
Factors affecting future requirements
p. 33-35 – general description and
– assumptions in model
pp. 37-38 – system restructuring
pp. 38-39 – allied health personnel
pp. 39-40 – technology evolution
pp. 40-41 – unmet needs
Ch. V, pp. 42-47 – geographic distribution considerations
p. 52 – summary
Tables 11, 12, 15
ADL, pp. 165-166; pp. 167-169; pp. 170-171; p. 205
Factors affecting future supply
p. 27 – general description
p. 52 – summary of assumptions
ADL, pp. 154-158, p. 205
Future supply projections
pp. 28-29 – general description
p. 36 – result summary
p. 52 – summary
Tables 4, 5, 6, 7, 8, 9
ADL, pp. 158-161
Future surplus/ shortage
p. 34 – brief summary
p. 52 – summary
Future requirements projections
pp. 31-33 – general discussion
pp. 35-36 –
assumptions in model
– results summary
p. 52 – summary
Tables 13, 14
ADL, p. 167; pp. 170-171
Policy implications and options
pp. 29-30 – broad options for supply control
Ch. VI, pp. 48-51 – postgraduate education
pp. 53-54 – general discussion
pp. 54-55 – re geographic distribution
pp. 54-55 – re postgraduate medical establishment
pp. 55-56 – final recommendations
Table 18

for physicians', or 'to identify medical manpower needs in Ontario for the year 2000 assuming continuance of the arrangement in the existing system, whatever its strengths and weaknesses' (p. 10). The Task Force sought direction from the Council, offering the two alternatives, and was instructed by Council to adopt the second approach. In effect, this direction by Council removed the important context factors with respect to cost-effective evolution of the health-care system (context factors 2 through 6) from the mainstream of the Task Force's analysis.

This direction is particularly difficult to understand as the importance of the 'objective of cost-effective evolution of the health-care system', as articulated in the first term of reference, appears to have been recognized by the Council. It was the Council that set out the context factors for the Task Force, and, as noted above, at least five of these make implicit if not explicit reference to the crucial importance of value for money.

The Task Force, for its part, devotes a substantial portion of its 'Introduction' (Chapter I) and 'Medical Manpower Issues' (Chapter II) to the subject of health-care costs. It notes that the 'perception developed during the 70's that the number of physicians in practice is particularly important as a determinant of cost' (p. 21), and the claim that physicians as suppliers of medical services are able to influence the demand for their services (p. 21). The Task Force returns to the issue of interdependence of demand and supply for physician services on p. 24, citing selected pieces of evidence from the research literature; it then goes on to discuss the importance of recognizing both goals of quality maintenance and, once again, cost control (p. 25). The Task Force also engaged research assistants to review literature on several context factors, including new health-care delivery systems and allied health personnel – two factors generally regarded as having the potential to improve the cost-effectiveness of health-care delivery (p. 22). Even within its own interpretation of the terms of reference, cost is an important concern: 'The questions therefore are concerned with the impact of medical-manpower numbers and distribution in Ontario's present system on health status, quality of care, and costs' (p. 24).

It seems clear, therefore, that the relationship between the number of physicians and health-care costs was accepted as a major and, perhaps, the primary motivating factor in this exercise by the three parties concerned – the Ministry of Health, the Council, and the Task Force. Yet concern for this relationship is not reflected in the important methodologic choices that the Task Force made during its deliberations and analyses. In fact, none of the key context factors relevant to the cost-effective evolution of the health-care system is built into the model of supply and demand for physician services (Chapter III), which the Task Force employed for its quantitative work on the balance between future physician supply and requirements, and upon which it based its conclusions and recommendations.

Exactly why the Task Force felt the need to seek direction on its methodologic approach to the first term of reference, and why, if there was any ambiguity concerning the terms of reference, Council did not seek confirmation or elaboration of them from the Minister, remain unanswered questions. This process, however, led the Task Force to adopt as its main objective for the Phase II study the examination

> of supply and demand for physicians projected to the year 2001 based on the assumption that the current health care system will remain in place and that medical manpower numbers should be sufficient to meet the demand which will arise. In other words the numbers should be sufficient (and no more) to maintain the quality of care characteristic of the present arrangements while allowing for innovation and for changes in demand attributable to new circumstances such as population growth and aging. (p. 25)

The Task Force does, to its credit, insert in a separate chapter (Chapter IV) a consideration of the potential for future reductions in physician requirements from the two context factors of new health-care delivery systems (making greater use of prepaid group-practice and Health Service Organizations) and allied health personnel. This is clearly intended as a supplementary chapter, however. Its title, 'Additional Factors Bearing on Demand', and its placement, after all quantitative estimates on future supply and requirement have been completed and presented in Chapter III, underline the fact that issues of cost-effectiveness played little or no role in the main conclusions or policy recommendations. Thus, despite recognition of the view that overservicing exists in Ontario, and that it is in part related to the number of physicians (p. 24), and despite its own assessment that new delivery systems and increased use of allied health personnel could and would reduce requirements for physicians (pp. 38-9), the Task Force concluded 'that the number of full-time equivalent (FTE) physicians billing OHIP in 1980 was consistent with the number of physicians required for the services rendered' (p. 52). This apparent contradiction is attributable to the absence of any consideration of the former factors in the quantitative models from which the latter conclusion is drawn.

The Task Force apparently felt that cost-effectiveness considerations were not part of its responsibility and, in addition, that incorporating them was not a feasible exercise. Interpreting this task as involving 'how best to structure, organize and finance the entire health-care system to achieve optimum effectiveness and efficiency', the Task Force concludes that such questions 'extend far beyond the terms of reference of this Task Force, which was not asked to fit medical manpower objectives into a redesigned system' (p. 24). Later, in the Chapter IV afterthought on important context factors not included in the quantitative model, the Task Force terms such factors 'a number of imponderables which could not be quantified and incorporated into the model of future demand' (p. 41).

The Task Force stance on the scope of the terms of reference was not only guided beforehand, but also subsequently endorsed, by Council, as the following passages from the accompanying OCH Report to the Minister of Health indicate:

> Council feels that the next step in the direction of an effective medical manpower policy is to examine options beyond the health care system as it is presently organized and operating ... Council therefore takes the position that Government should identify and examine several different health care delivery arrangements with a view to determining which offers the optimal balance of efficiency and effectiveness. (p. 13)

There seems little doubt, therefore, about the Council's complicity in the process that ultimately resulted in adoption of the assumptions on which the Task Force's analyses were based. The Council offers a number of loosely related rationales for its direction to the Task Force:

- the pressures of time, [and] limited resources (p. 10)

> – the impracticality of predicting medical manpower requirements for a reformed health care system not yet defined for Ontario (p. 10)
>
> – [the paucity of quantitative data available to back claims that] changes in delivery systems, increased use of auxiliary health care personnel, appropriate use of new technologies, and increased emphasis on disease prevention and health promotion activities may lower the requirements for medical manpower in the future (p. 12)
>
> – [the belief that medical manpower policy should not be used] to manipulate the system ... [rather, that medical manpower policy should serve the health care system as it exists at present and that manpower policies should change to conform with overall provincial health policy as it evolves and is put into operation (p. 11)

None of these rationales stands up under close scrutiny (see Chapter 5 below). The first probably precluded a full-blown, need-based analysis; there was much that could have been done, however, and many things that could have been done differently, under the same time-and-resource constraints.

The major implication of the interpretation of the terms of reference adopted by the Task Force at Council's direction was that it produced a significant narrowing of the quantitative model built by the consultants and employed by the Task Force to arrive at its main conclusions and recommendations. The assumption of the continuance of arrangements in the existing health-care delivery system as the cornerstone for modelling in essence restricted the policy exercise to a projection of the status quo, with certain requirement-increasing adjustments. As two of the major factors that were omitted from this adjustment process owing to the interpretation of terms of reference – new delivery systems and allied health personnel – would have decreased physician requirements, the interpretation had the effect of removing important potential for reduced requirements from the quantitative range estimates.

This is particularly significant because the main conclusions and recommendations of the Task Force, which warn of a possible physician shortage and advise maintenance of current levels of Ontario medical-school enrolment (pp. 35, 56), are based only upon the quantitative model in Chapter III, i.e., only upon factors likely to increase physician requirements. Thus, even though evidence existed suggesting that the current stock of physicians is larger than necessary given the effect of the number of physicians on utilization levels, and the possibility of modifications to current delivery arrangements, the Task Force was able to conclude that no oversupply existed in the base year (1980).

THE SUPPLY ESTIMATES

It is with Chapter III that the Report begins documenting the Task Force's quantitative treatment of supply and requirements. One needs first to note that both supply and requirements estimations focused on the provision of patient care – i.e., clinical rather than administration, teaching, research, and other functions. But even for clinical service alone, definitions and approaches to supply measurement abound (Barer, Wong Fung, and Hsu 1984). The consultant, Arthur D. Little Inc. (henceforth ADL), adopted an approach of estimating full-time-equivalent (FTE) clinical practitioners from a combination of OHIP billing records, intern/resident records, and Ministry of Health records on non-fee-payment practitioners. ADL's supply projections, however, were based only on the FTE clinical physicians billing OHIP, plus a consideration for interns and residents. These comprised about 78 per cent of the total FTE clinical physicians. The FTE definition adopted for OHIP physicians assumed that any practitioner billing OHIP in the amount of $80,000 or more in fiscal 1981 (1981/2), or the equivalent deflated amount in earlier years, was 1 FTE. Practitioners billing less than $80,000 were grouped into $10,000 'billing intervals', and each such practitioner was counted as the ratio of average billings in his/her interval, to the FTE threshold. Thus, in 1981, a practitioner billing $61,000 would be counted as 0.80 of an FTE (assuming average billing in the $60,000-$69,999 interval was $64,000). Following the GMENAC procedure (United States 1980), the consultants counted interns and residents as 0.35 FTEs each; physicians paid through various other non-fee arrangements were added to the OHIP total for 1981 only (p. 176 1981).

The projection of future supply to the year 2001 took as a basis the historical FTE supply providing OHIP services for the period 1971 to 1980. Factors affecting future supply that were incorporated quantitatively were: new Ontario graduates and non-Ontario new registrants/additions; and deaths, retirements, emigration, and out-migration to other provinces (subtractions). In fact, ADL stated that it was unable to obtain disaggregated subtractions data for more than a limited time period (1979 to 1981), so that it used a single subtractions variable combining all contributory factors.

Rather than attempting to establish historical FTE additions and subtractions based on OHIP plus College of Physicians and Surgeons of Ontario (CPSO) records combined, ADL chose to model and project using CPSO historical records, and then convert the resulting projections to an OHIP basis using a projected relationship between OHIP FTEs and CPSO registrations. Taking each factor in turn, the number of new Ontario graduates registering to practise in Ontario was postulated to be a function of population growth, local (Ontario) 'market conditions' (relative earnings), and other unspecified factors incorporated in time-trend variables. This component of the model predicted that new registrants per capita would fall substantially to the year 2001, primarily because fewer Ontario graduates were predicted to be staying in Ontario. Because the Task Force deemed this an unlikely situation, it substituted the higher average value for 1980 and 1981 for the model's projections of new registrant numbers as a proportion of new graduates.

For non-Ontario-graduate new CPSO registrants, the ADL model postulated that such inflows would be related to the ratio of CPSO registrants to population, and to relative earnings. Only the former proved to be a significant historical explanatory factor. In-migration was predicted to fall from about 1.9 per cent of CPSO stock in 1980 to 1.1 per cent in 2001. Subtractions from CPSO stock were anticipated to be related to relative earnings, the CPSO physicians-to-population ratio, and other unspecified time factors. In fact, only relative earnings were significant (the higher the earnings, the less attrition). But as ADL notes, the failure to disaggregate types of attrition resulted in low explanatory power for this segment of the model (p. 158).

Applying these components of the supply model under varying sets of assumptions about the explanatory variables provided estimates of CPSO registrants in the years 1982 through 2001. These were then converted to OHIP FTEs using the estimated time trend for the ratio of OHIP FTEs to CPSO registrants. ADL reported supply projection results for ten different sets of assumptions or scenarios. The base model was largely a straight projection of the model's historical relationships (with the Task Force's imposed adjustment to the proportion of new

Ontario graduates registering in Ontario). Other scenarios were based on adjustments to those independent variables subject to policy modification (number of graduates, immigration, fees/earnings).

In general, 'reasonable' modifications to the assumptions on numbers of graduates (i.e., policies of altering medical-school enrolment) had only a minimal (less than 5 per cent) impact on the projected supply of OHIP-FTE physicians in the year 2001. Similarly, small relative fee-level changes were found unlikely to modify supply to any great extent. (We presume, for lack of other information, that changes in relative fees were applied linearly to the benefit indices, thus precluding any utilization effects.) By contrast, if the negative relationship between physicians per capita and in-migration is overridden with other in-migration assumptions (e.g., maintaining 1980 levels of in-migration), the effects on projected supply intensify.

In all ten of the simulations, the ratio of population to FTE physicians in clinical practice was reduced (improved) by 1991, and significantly reduced by 2001. The Task Force labelled as most likely the scenario based on constant numbers of new registrants from Ontario medical schools, and all other relationships continuing their estimated historical patterns.[6] This scenario estimated a 24 per cent increase in OHIP-FTE physicians from 1981 to 2001.

This completes our brief description of those sections of the Task Force Report falling within the three left-column cells of Figure 2.

THE REQUIREMENT ESTIMATES

The method applied by ADL to estimate current requirements amounts to little more than an alternative approach to supply estimation. In that regard, it continues a Canadian tradition that we have described elsewhere (Lomas, Stoddart, and Barer 1985). ADL, presumably under instructions from the Task Force, followed the method employed by the National Committee on Physician Manpower (Canada 1975), in a three-stage procedure:

- Compute the average time required to provide each of 14 broad service categories (e.g., complete examination, minor surgery).
- Apply these average times to frequency counts of utilization based on actual OHIP records, to compute total clinical service time required.
- Convert to FTE physician requirements using full-time, hours-of-work information.

Laboratory and psychotherapy services were excluded from step (i) (leaving 13 broad categories) – the latter because the service is billed in time units. Time requirements included direct (actual provision) time, and indirect (associated activities such as waiting, telephone, report writing, etc.) service time. This method was applied to each specialty in steps (i) and (ii), and the results were aggregated before step (iii) because specialty-specific FTE definitions were not applied in supply estimation.

The information used in step (iii) to convert from total required minutes or hours to FTE physicians was based on hours of work self-reported to an Ontario Medical Association survey conducted in 1980. That survey indicated average hours worked of 2,565 per year (excluding on-call time), or about 53.5 hours per week, 48 weeks per year. The result of this process was estimated 1980 FTE requirements about 5 per cent lower than estimated FTE supply. Having estimated requirements using services supplied, and finding a discrepancy with estimated supply, the consultants concluded that, among other possibilities, the hours-of-work figures might be high (a conclusion with which we cannot disagree), and arbitrarily set 1980 requirements equivalent to 1980 supply. If self-reported hours tend to be upward-biased, then, for example, a practitioner working 2,300 hours per year and earning $150,000 would be converted to about 0.9 FTEs on the requirements side, but would be 1 FTE on the supply side. We consider these hours-of-work issues in more detail in Chapter 4. Of far more importance, and considered in Chaper 3, is the methodologic issue of utilization as a basis for requirements determination.

The consultants took into quantitative account four general factors postulated to affect future requirements:

- General growth in population.
- Changes in the age structure of the population.
- Increasing proportions of female physicians.
- Changes in the hours of work.

Continuing its utilization-based approach, ADL applied projected changes in general population to the 1980 base requirements. Then, by applying age-specific utilization (expenditure) rates in 1980 to the projected age mix of the population in 1991 and 2001, it estimated age-adjusted per capita expenditure for each year. The resulting increases relative to 1980 were then converted by assumption into comparable requirements increases.

A 'female productivity' adjustment was made to account for indications that female physicians work roughly 75 per cent as many hours as their male counterparts. Of course, if the ratio of men to women in the FTE stock were to remain unchanged, no adjustment would be necessary. But increasing proportions of female graduates in recent years (Association of Canadian Medical Colleges 1984) suggested that the period under consideration would see a steady increase in the stock ratio of women to men. This changing ratio was estimated to increase requirements by 3.2 per cent for the year 2001, assuming no change in male-physician hours of work, or to have no effect by 2001 if female and male hours of work converge.

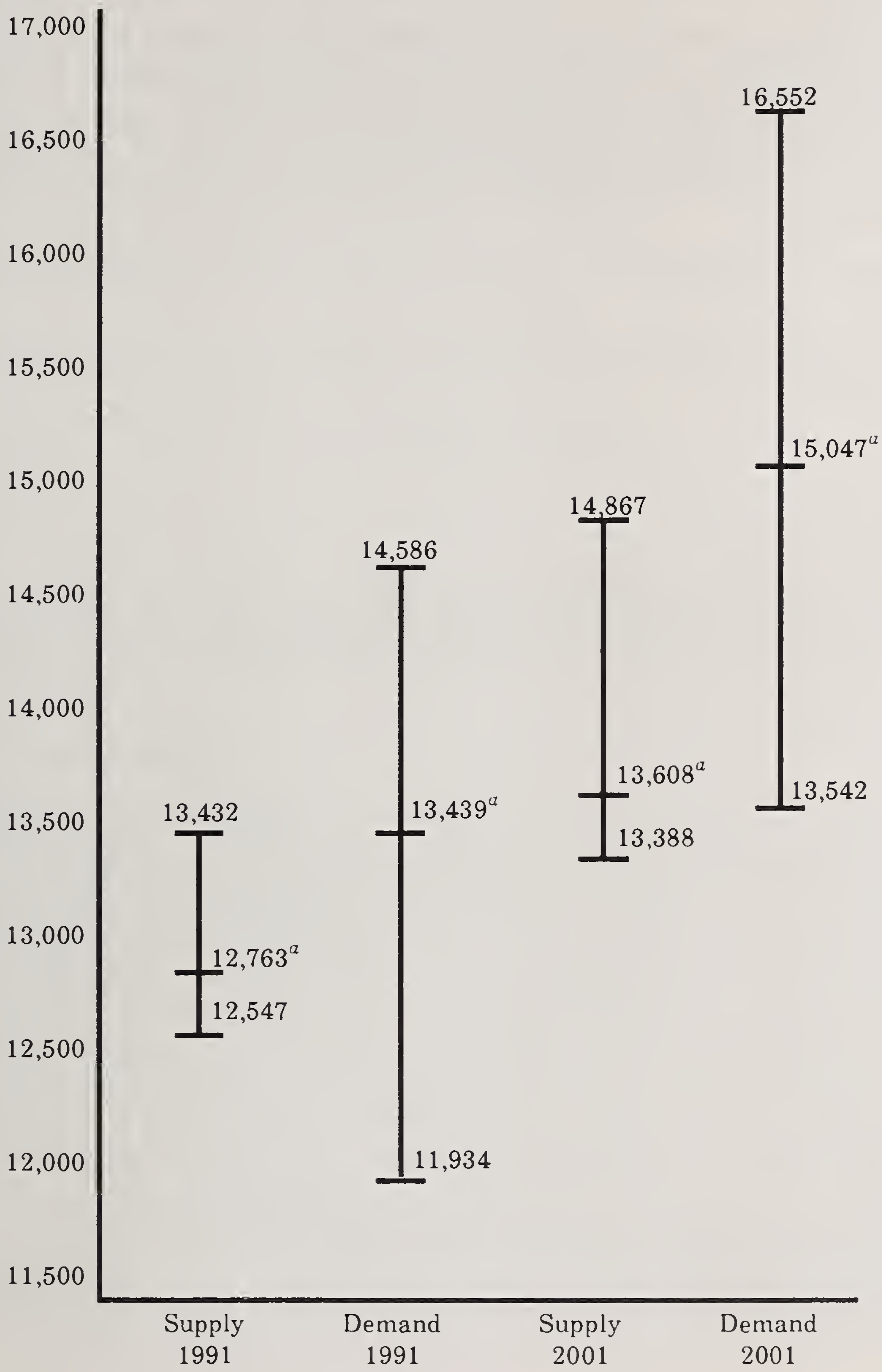
The fourth adjustment was to incorporate the possibility that hours worked generally would fall by the year 2001. Under an assumption of invariant hourly productivity, this would imply an offsetting increase in requirements. By combining this possibility with the 'female productivity' assumption above, two scenarios result: one in which females continue to work 75 per cent of male hours through to 2001, and the other in which hours of work converge. In combination with the assumption that general average hours of work will fall by 12 to 13 per cent by 2001, the latter scenario strikes us as somewhat more likely for any given year, whereas the former may more closely portray life-cycle hours of work.

These four factors are applied to the base-year requirements to project requirements in the years 1991 and 2001. A range from 14,565 to 15,529 for the year 2001 results from applying alternative female-productivity assumptions. The Task Force averaged these and then applied an arbitrary ± 10 per cent to develop its requirements range of 13,542 to 16,552 OHIP-FTE physicians for 2001 (see Figure 3).

The supply-projection range for the year 2001 was developed from a low scenario based on 15 per cent reduction in the number of Ontario graduates (13,388 FTEs), and a high scenario based on new registrants following the parameter estimates of the supply-projection model (increasing to 1992, then falling back), and immigration staying higher than in the base-year models (14,867 FTEs).

Out of this analysis comes an assessment of future balance suggesting that, although there is some overlap in the supply and require-

FIGURE 3
Ranges for projections of supply and demand for FTE physicians billing OHIP – 1991 and 2001



a Most likely point estimate.
SOURCE: Ontario Council of Health (1983, 36).

ments ranges, all indications are that an aggregate shortage is likely. To its credit, the Task Force sets out a number of points of uncertainty that may affect this apparent result (p. 35). These points (and others) are taken up in considerably more detail in the following chapters of our study.

At this stage in the report, the Task Force returns to the second of the right-column cells in Figure 1 to address other factors that may affect future requirements. These are factors that, for one reason or another, were for the most part not incorporated into the simulation exercise but that, nevertheless, warranted mention in the view of the Task Force.

Thus, in Chapter IV, we find some discussion of the following four factors:

1 Delivery/financing restructuring (e.g., Health Maintenance Organizations).
2 Allied health personnel substitution.
3 Technology advances.
4 Unmet needs.

A fifth area – the possibility of overutilization – was offered by ADL to the Task Force as a factor requiring at least qualitative consideration. The Task Force chose not to address the factor in the context of Chapter IV.

In deliberating on the likely implications of restructuring the delivery system to alter both financing and provision arrangements, the Task Force focused on the potential application of the Health Maintenance Organization (HMO) concept to the general Ontario population. ADL was asked to quantify the implications of applying this model, and concluded that there was a potential for reducing physician requirements to around 20 per cent less than projected supply.

For the issue of potential personnel substitution, the Task Force points out the potential for partial provision of physician services by less highly skilled (and less costly) personnel. A limited literature review is drawn on to make two points – that evidence of potential cost savings does exist, and that there are numerous barriers to widespread implementation. A number of the key pieces of literature in this area are, in fact, Ontario-based (Spitzer et al. 1973, 1974; Lomas and Stoddart 1982b, 1985; Denton et al. 1983). Lomas and Stoddart (1985), for example, estimated that unfettered substitution of nurse practitioners to provide a conservative estimate of the physician services for which they are trained could effect 20 to 32 per cent reductions in general-practitioner requirements by the year 2001. The Task Force merely notes that this is an area worthy of serious attention. It has remained so for at least a decade!

Technology advances are different from the first two factors. For personnel substitution and restructuring, the issue is not so much their requirements-reducing potential (that is generally taken as established fact) as it is the likelihood that the regulatory and professional obstacles can be at least partially overcome. In contrast, the manpower issue for technology is evidential uncertainty as to aggregate and specialty-specific effects. The Task Force took the historical record as suggesting an aggregate utilization-increasing effect, and therefore concluded that, 'on the whole, it seems more likely that such impact [of new technologies] will increase rather than decrease the requirements for physicians' (p. 40).

Finally, the Task Force notes a number of situations or factors that it feels are indicative of unmet needs (p. 40) – remote communities, selected specialty shortages, 'shifting consumer emphasis on prevention', 'shifting morbidity patterns', and 'chemical and physical environment'. The Task Force concluded that these factors 'in the future probably will increase the requirements for physicians' (p. 41).

GEOGRAPHIC DISTRIBUTION, POSTGRADUATE ESTABLISHMENT, AND THE RECOMMENDATIONS

Chapter V of the Report is intended to address cursorily the issue of the geographic distribution of physicians. In our framework in Figure 2, this falls within the factors affecting future requirements; that is, aggregate requirements should take into account both geographic surpluses and shortages, as well as cross-boundary referral networks, access difficulties, and the like. Unfortunately, rather than attempting any assessment of geographic adequacy of supply, or adjustment to requirements to take account of geographic surpluses or shortages, the Report merely describes the various components of the Underserviced Area Program, and other Ontario programs that have been designed to address distributional questions.

Chapter VI brings forward and reconsiders the conclusions and recommendations from the Phase I Report on the postgraduate medical establishment. In that earlier Report, summarized on pages 48 to 50 of the Phase II Report, the Task Force had estimated the size of the post-graduate establishment necessary to:

> 1) produce an output which in the absence of movement in or out of the province would allow Ontario to be self-sufficient in terms of total numbers of doctors;
>
> 2) maintain the current ratio of active physicians to population;
>
> 3) meet Ontario's current obligation to provide specialist training for other provinces;
>
> 4) allow a margin of safety of 10% to meet additional future needs arising because of an aging population, an increase in the proportion of women physicians, changing work habits, new technology, new specialties and possibly other factors. (p. 50)

The Task Force had concluded that with the reduction of 425 places as recommended by the Minister, Ontario would be able to satisfy these four requirements.

With its more comprehensive quantitative analysis from ADL, the Task Force modified its postgraduate-establishment sufficiency criteria by dropping (4) and replacing (2) with 'provide a supply within the range of the anticipated demand' (p. 51). This served to increase requirements relative to maintaining a constant ratio of physicians to population because, as we note above, the factors built quantitatively into the ADL requirements projections each increased the required physician-to-population ratio. Applying the restructured criteria to the question of the advisability of reducing the postgraduate establishment changed the Task Force's Phase I recommendation to one of a much-softened reduction in postgraduate positions (from 425 to 125). We consider the analysis on which this result is based in more detail in Chapter 5.

The final chapter of the Report is taken up first with a brief summary of the contents and processes of the previous chapters, and second with a series of recommendations that are heavily influenced by the quantitative model's prediction of a likely physician shortage in the future. We conclude this chapter by listing those recommendations without comment. They receive sufficient scrutiny in the pages that follow:

1 to maintain a balance between supply of full-time equivalent physicians and the demand for their services;

2 to maintain the current policy regarding the size of medical school enrolment in Ontario by keeping the number of graduates at 606 per year;

3 to monitor the entry of physicians from outside Ontario and limit or open up immigration from other countries according to the demand for medical manpower;

4 to not interfere further in policies affecting supply of physicians until there is clear evidence that the supply will not meet the demand or that it will exceed the demand;

5 to improve and maintain a data base to provide information on the supply of and requirements for medical manpower;

6 to maintain a simulation model in order to monitor and adjust policy regarding the balance between the supply of and demand for medical manpower;

7 to explore the potential to increase physician productivity through policies such as those that would provide more effective use of allied health personnel and the development of multi-plan delivery systems based on prepayment and group practice;

8 to modify projections of demand in the event that the Ontario health care system is substantively modified;

9 to evaluate government-sponsored and university-sponsored programs in Northern Ontario including the Underserviced Area Program and other manpower-related educational and service programs with a view to coordinating and improving the effectiveness of these programs;

10 to create and maintain a data base in order to monitor the distribution of physicians' services in Ontario;

11 to make no further reductions in Ministry of Health funded places for interns and residents beyond those scheduled for 1983. (pp. 55-6)

In the next chapter, we turn to the detailed examination of the Task Force's methodology, and begin with a look at the general approach and assumptions.

3

The view from outside: selecting a general approach and adopting assumptions

Estimating physician requirements generally follows one of three distinct approaches – need-based, demand-based, or utilization-based. In this chapter, we first attempt to clarify the conceptual and empirical (measurement) characteristics of each. This allows a detailed examination of the methodologic choices inherent in the Task Force Report. We submit that the Task Force was never clear or consistent in its approach, that the actual methods are largely consistent with a utilization-based approach, and that this approach restricts at the outset the likely range of results. By equating current utilization with current physician requirements, the Task Force takes a large step toward finding a future shortage of physicians. When combined with selective quantification of only change factors that will serve to increase future requirements, a future shortage finding is virtually assured. We note that the choice of a utilization-based approach also affects the Task Force's treatment of physician productivity.

In this chapter, we focus on the distinctions between the general methodologic approaches available to the Task Force (recall Figure 1, in Chapter 1), and on the implications of the approach adopted by the Task Force. The approach chosen for requirements estimation was only in part determined by the modification to its original terms of reference. Of at least equal importance were subsequent methodologic choices represented by the various choice nodes in Figure 1.

We begin the chapter, then, by providing a clarification and an elaboration of the three alternative approaches represented by the left-most 'column' in Figure 1 – the conceptual and measurement distinctions between need-, demand-, and utilization-based methodologies. The Task Force's particular approach (a utilization-based analysis), and its schizophrenic adoption of that approach, dictated numerous subsequent methodologic decisions. Two such key decisions were its treatment of physician productivity and its selective quantification of potential 'future modifications' portrayed in the right-most columns of Figure 1.

These three major issues (choice of general approach, treatment of physician productivity, and selective quantification) share the following characteristics:

- They pervade the study, surfacing repeatedly, and influencing the tone, methods, and outcomes of the study.
- They bear directly on the conclusions and recommendations; different approaches or choices would have had a major impact on the findings.
- They are subject to empirical question; the literature is sufficiently inconclusive on each that one might readily have justified quite different approaches.

This chapter differs from the following chapter in that Chapter 4 narrows our focus further in describing specific points of question generally falling outside the three generic problem areas dealt with below.

NEED, DEMAND, AND UTILIZATION APPROACHES

The need for a consistent intellectual framework is nowhere more apparent than in the process of estimating future requirements. Our discussion here bears particularly on the right-most column of Figure 2 – those stages of the analysis devoted to estimating current and future requirements. The confusion surrounding the choice of demand, need, or utilization for the purposes of requirements estimation has two parts – measurement problems, and a conceptual failure to make distinctions among the three. We take each in turn.

Need, demand, and utilization – conceptual distinctions

Although one might be inclined to presume that physician requirements should follow directly from health-care needs, in fact the concept 'need', both theoretically and as a planning tool, has troubled analysts of the health-services sector at least since Boulding's (1966) seminal article. The confusion arises for a number of reasons. First, any reasonable definition of health-care needs is dependent on an operational definition of health; 'it would seem to be sensible to regard the need for health care services as ultimately related to a need for health *per se*, since it seems not unrealistic to suppose that health services are best viewed as instrumental in the promotion of better health' (Culyer 1976, 12). But if any concept has caused more confusion than 'need' in a health care context, it is surely 'health' itself (Culyer 1978). Not only does the concept have different boundaries for different analysts (physical only, mental, emotional), but it is not a steady state. The Iron Law of Epidemiology (that one out of one dies) implies that 'ideal health', however defined, will be a moving target over a lifetime, as one's 'health capital stock' runs down (Grossman 1972). Second, even an operational definition of health may find many 'health needs' (that is, a deficit from 'ideal health') unable to be met by existing health-care knowledge and technology. Of course these points are interdependent, for the 'support and caring' role of health care may be important to emotional, and even physical well-being, even in situations where the prognosis suggests no physical cure. Are these, then, health-care needs? Third, even with an operational definition of health *and* exclusive attention to those conditions for which current knowledge and technology can improve health status, defining health-care needs requires a clear understanding of the functional relationships between health care and health. Fourth, for any such situation there may be many potential combinations of health-care resources that would yield equivalent health-status impact. Fifth, even if one were able to develop an operational concept of health-care needs in some absolute sense, the process of translating these into manpower requirements (physician and other) necessitates, at some point, a balancing of health-care needs and human needs for other services and commodities – food, education, shelter, legal, protection (Culyer 1976). 'Health at any cost' is both meaningless and constantly refuted by each of us in his or her daily choices.

Little wonder, then, that we find diverse need classifications – from (1) Boulding's (1966) distinction between homeostatic needs of a self-correcting nature and those requiring at least professional treatment if not also professional exposure, through (2) the controversies surrounding the issues of whether health problems that are not treatable by current expertise and technology represent health-care 'needs' (Jeffers, Bognanno, and Bartlett 1971; Matthew 1971; Williams 1974), to (3) White's (1983) recent categorization of 'perceived need' (the perspective of the affected individual), 'socially determined need' (reflecting social choices and priorities), and 'professionally defined need' (the perspective of the health-care professional). For the purposes of this chapter, we borrow a conceptualization from earlier work (Lomas, Stoddart, and Barer 1985). There we argued that 'true need' is that health-care use 'necessitated by applying the current "best (cost-effective) technology" to symptoms of predictable or actual disease incidence'. Of equal importance here is the point that the concept is complex, potentially ambiguous and confusing, and therefore a concept whose operational definition must be made explicit if it is to be used.

Of more practical import is the conceptual distinction between need and demand, bearing in mind again that what we speak of in this context is demand for health care as it impinges on the derived requirements for health-care personnel. Two important distinctions bear mentioning. First, the notion of demand may be distinguished from that of need in terms of *perspective*. Demand reflects only an individual's priorities and choices. Although that demand may be shaped by social norms and professional judgements of need, it is still a personal expression of choice, rather than a joint personal/social/professional determination. Second, demand is a concept solidly grounded in economics. Unlike need, it is affected by prevailing prices and individual resource constraints (wealth and income) among other things (Williams 1974; Culyer 1976), and it is a concept reflecting *individual choice*. In the Canadian context, where potential consumers of health-care services face little in the way of prices, indirect (time) prices may still affect the extent to which needs are exercised as demand.

This provides ample scope for both conceptual and empirical distinction between need and demand. All needs, however determined, may not be exercised as demands: there may be unidentified needs, needs for which individuals are unable – or choose not – to seek care, or needs for which no effective course of treatment is available (if such situations are incorporated in one's definition of need). Conversely, demand for care may emerge without any underlying need (from at least one of the three perspectives noted above – personal, social, or professional).

Utilization of health care is conceptually the most straightforward of the three terms, because it is absolute, having no normative or ethical overtones, and being independent of perspective. It represents simply a factual reporting of events (measurement problems aside for the moment). In particular, utilization of health care services results from individuals presenting themselves for care from health-service providers. But utilization is more than a measurement choice. A utilization-based requirements methodology takes as its intellectual framework the prescription that, by and large, current physician service requirements are whatever is being provided by physicians. Utilization may reflect need exercised as demand, or it may not. We noted above the ways in which need and demand might diverge. Thus, even if a one-to-one relationship existed between demand and utilization, the same potential divergence would hold for need versus utilization. But there are two additional forms of potential slippage between demand and utilization. First, demand (in the sense of individuals being ready, willing, and able to purchase services at prevailing direct prices) will not be translated into utilization in the absence of available supply (and in an environment of administered direct prices, this would be reflected in upward pressure on indirect [access] prices). Second, providers may influence individuals in such a way as to result in utilization falling short of patient-initiated demand (discouraging services demanded by individuals) or exceeding demand (recommending a subsequent course of treatment for an initial patient-initiated demand) (Stoddart and Barer 1981). A utilization-based requirements approach glosses over any and all such distinctions.

The potential for slippage among need, demand, and utilization is therefore significant; it will occur at least whenever:

- Needs are not expressed as demand, implying no utilization.

- Needs expressed as demand receive either insufficient or excessive treatment (avoidably or unavoidably), implying under- or over-utilization.

- Demand without underlying need receives attention, implying unnecessary utilization.

Overlayed on the conceptual distinctions between the three terms are a series of measurement confusions and problems, only some of which have been alluded to thus far.

The problems of measuring need follow closely the problems of defining the concept. One requires a benchmark of 'ideal health', age adjusted perhaps, against which to measure a health deficit. Then, operational and consistent ways of measuring physiological and psychological disability are required to quantify any (ideal minus observed) health deficit. It is here that one becomes entangled in issues of perspective, and whose opinions count (Culyer 1976; Jeffers, Bognanno, and Bartlett 1971; Williams 1974). Finally, the impact of health care on health status must be both well understood and measurable if one is to assess the health-care needs implied by any such deficit. It is a tall task, and one that is avoided with remarkable and not surprising regularity.

This leads to the three general need-based measurement approaches portrayed in Figure 1 in the 'Measurement' column. The first is to actually attempt to quantify health-care needs through the use of epidemiologic surveys. The intent of such surveys could be to estimate, using sampling techniques, the extent of the ideal versus observed health-status deficit, and to translate such deficit into health-service requirements (Wolfe et al. 1977). A second approach is to adopt quantity of services demanded (patient-initiated requests for treatment/information) as a need proxy. Straight adoption would leave unmet needs and needs not exercised unaccounted for and, on the other side of the ledger, would incorporate some (frivolous) demand that does not represent need. The third, and most straightforward approach to measuring need is to proxy need by utilization. The more one is able to modify utilization to account for unmet needs and over-utilization, the better will utilization proxy need.

Figure 1 makes clear this distinction between conceptual approach and measurement method. Thus, one may adopt demand as a measurement proxy for need, and then attempt to adjust for unmet need and frivolous demand. This is quite distinct from choosing a demand-based approach to estimating requirements, both in choice of methodology and in the scope for policy implications that may be drawn from each exercise. If a demand-based approach is chosen, one cannot claim intellectual consistency by incorporating 'unmet needs' into the quantitative analysis or into the process of policy formulation.

Just as with the need-based approach, utilization may be adopted as a measurement proxy for demand, except that now one has the added (and not insignificant) methodologic task of identifying that patient-initiated segment of utilization representing quantity of services demanded as a result of consumer choice. It is at least theoretically possible that some quantity demanded will not be translated into utilization at all because suppliers are unwilling or unable to supply the demanded services (e.g., abortion). But even assuming away this first possible discrepancy between quantity demanded and utilization, measurement of quantity demanded requires the ability to ferret out a) those segments of utilization that represent consumer initiative or choice exercised in response to prevailing relative (time and money) prices from b) those segments that are not independent of health care suppliers but represent a direct response to a supplier's call for the consumer to demand (utilize) health services. There is no room for supply variables in the conventional microeconomic view of consumer behaviour in which the concept of demand is solidly rooted. Consumer sovereignty precludes agency relationships. Thus, utilization of health care may be less than, equivalent to, or greater than quantities of health care demanded (Stoddart and Barer, 1981), and one's ability to make adjustments for the two sources of slippage will determine the quality of utilization as a proxy for quantity demanded.

Finally, a utilization-based approach has only one associated method of measurement – utilization (although as a separate issue not muddying up Figure 1, there are many ways of measuring or proxying utilization itself – e.g., payments to practitioners, number of services, payments deflated by a price index).

What are the implications of these conceptual and empirical distinctions in service requirements estimation? A needs-based approach will be intent on determining services required to eliminate any deficit between current health status and health status attainable through application of current technology and knowledge. The use either of quantities demanded or of utilization as measurement proxies begs for significant and difficult modification in order to achieve intellectual consistency.

In contrast, a demand-based approach to estimating service requirements does not have to concern itself with needs, and is conceptually unencumbered by issues of 'attainable' vs. 'potential'. But it poses the difficult measurement problem of identifying quantities demanded.

Finally, a utilization-based approach to estimating requirements would take as a baseline current utilization as representing current service requirements.

Onto each of these bases, any number of requirements-projection assumptions and adjustments could be applied, as suggested in the right side of Figure 1. In turn, a different set of assumptions is needed to translate service requirements into physician-service requirements and, finally, into the future requirement for physicians (Figure 1).

Conclusion

Although this rather protracted flogging of demand, need, and utilization may strike the reader as excessive, the misuse and misapplication of the terms is endemic to the Task Force (and other physician manpower) reports. Not only does the study apply the concepts inconsistently and incorrectly, but it is from those errors in application that the Task Force ends up in trouble on the other two issues addressed in this chapter. We do not claim to have provided the definitive clarification. What is necessary (and what we hope the above discussion has achieved) is an awareness of the conceptual and empirical distinctions among the three concepts. Only with such insight can one exercise the care necessary in moving from conceptual framework to empirical measurement and estimation, and then to policy implications and recommendations in a logical and consistent manner. Anything less may at best be inaccurate, at worst misleading and costly.

THE TASK FORCE'S HYBRID APPROACH

Why was a demand-based model chosen after the Task Force's lengthy deliberations? First, although the Task Force does not mention this in its Report, it is learned from the attached Report of Council that:

> The Task Force initially asked the consulting firm to design a need-based study to be applied to the Ontario situation but this was found not to be feasible given the limited resources, state of the art and time available to the Task Force. (p. 12)

A need-based study would have been both complex and expensive. It would have required review of or actual conduct of epidemiologic studies to determine the population's 'need' for effective health services, translation of that into an appropriately specified physician workload, and calculation of the physicians required to meet that workload. It may well have been beyond the resources and/or time available to the Task Force. But it is not at all clear that such a study would have been unfeasible given the state of the art. Research is usually more difficult than projection, and often must precede it; however, need-based studies are possible, and, to our knowledge, at least one has been completed recently (United States 1980) and one in the more distant past (Lee and Jones 1933). At least consistent and thorough attempts should be made in a need-based study using utilization as a proxy to adjust for known instances of over- or under-utilization in aggregate, based upon existing evidence in the health-services research literature.

The second reason – and the only one identified by the Task Force itself – stems from an apparent conclusion made by the Task Force that the assumption of the continuance of the status quo structure and delivery arrangements of the health-care system rules out the choice of a need-based model. In fact, although the alternative assumption to allow modifications to the current arrangements would have complemented a need-based model, *a need-based model is not conceptually inconsistent with the continuance assumption.*

The discussion of the subject presented by the Task Force on pp. 31-2 seems particularly confused on this point. In its listing of arguments submitted to support the proposition that the Ontario system is not cost-efficient,[7] it includes the concepts of excess demand, unnecessary utilization, 'other' context factors concerning modifications to delivery arrangements, and unmet needs. It then appears to equate cost-effective evolution of the health-care system with a need-based approach:

> Given all of the above should the Task Force attempt to identify the most desirable evolution of the health care system and quantify its implications for physician requirements? In other words, should the Task Force use a need-based approach to predicting physician requirements? (p. 32)

The Task Force goes on to say that, 'Aside from the fact that an analysis of need based on hypothetical reform would not provide a basis for current policy' (p. 32), it foresaw other difficulties with a need-based approach, yet these difficulties again related to potential modifications to the delivery system. From our definition of need above, it seems clear that one does not necessarily have to examine hypothetical structural reform in order to assess the population's health care needs; neither does one necessarily have to depart from the present arrangements in specifying a system to meet that level of population health need. Finally, in view of this discussion, it is ironic that the Task Force concludes that 'for current policy purposes the only useful analysis would be demand-based' (p. 32).

Utilization and a touch of need as a demand concept

Having chosen a demand-based model, the Task Force proceeded to employ utilization data without any serious recognition of either the conceptual or empirical distinction between 'demand' and 'utilization' or of the implications for eventual assessment of a surplus or shortage of physicians. In the remainder of this section, we attempt to follow chronologically the usage of the three concepts so as to illustrate the breakdowns in logic and consistency that ultimately render the recommendations suspect.

The stage begins to be set as early as Chapter I when the Task Force provides a cursory review of the literature suggesting some empirical divergence between need, demand, and utilization (p. 24). This discussion is particularly important because it is offered in the context of a raison d'être for the study – a steadily increasing physician supply has motivated policy concern *because of* the apparent incongruity of need and utilization! But the Task Force quickly notes (p. 25) that such evidence should not necessarily be 'taken at face value', and then proceeds to dismiss it. The possibility of a distinction between need and utilization never emerges in the quantitative analysis, and the relevant literature is not addressed subsequently. What follows, instead, is a narrow discussion of factors that may increase *demand* (increased chronic disease, new specialties, new technology, population aging, 'and the *needs* [our emphasis] of under-serviced areas' [p. 25]). The interchangeability of demand and need, with no mention of utilization, portends things to come. Although new specialties may increase need by expanding the base of medical knowledge, they are likely to leave demand unaffected, and may increase or reduce aggregate utilization. Similarly, the needs of underserviced areas, unless they change, will not in and of themselves increase demand. Chapter II closes in confusion:

> – too great a concern for costs [may limit] the amount of care provided [(*utilization*) while] failing to assess *legitimate demand.*
>
> – medical manpower numbers should be sufficient to meet the *demand* which will arise.
>
> – changes in the health care system ... could modify and in particular reduce the *need* for physicians. (p. 25, our emphases)

This completes a shift from concern about possible divergence of need and utilization to a focus on ensuring a physician complement able to meet future *demand* for *services* adjusted for the potential of system changes to reduce the *need* for *physicians*. Not only are the concepts of need, demand, and utilization used with great abandon, but there is no apparent consistent cognizance of the linking role of the production function in distinguishing *health service* requirements and *physician* requirements.

The introductory paragraph of Chapter III (p. 26) states that the chapter examines, among other things, 'the demand for [physician] services'. In fact, the chapter (and the Task Force) do not. Physician requirements are addressed over pp. 31-4, under consecutive titles of 'Assessing the Number of Physicians Required' and 'Projecting the Demand for Physicians'. The Task Force begins by noting the distinction between two possible methodologic approaches to estimating requirements – 'need-based models, and demand-based models' (p. 31). Its observation that these approaches 'are designed to answer altogether different policy questions' (p. 31) seems to get lost in the translation to policy recommendations. Demand-based approaches are most suitably embedded in a policy framework that assumes (within an environment of national health insurance) the government is responsible for the provision of all care demanded. Need-based approaches fit best with the policy approach that there is a responsibility for providing care in all situations likely to benefit from it, which will not necessarily be all the situations in which it is demanded. Of course, there is also the third possibility of a utilization-based approach – not even mentioned by the Task Force – that fits best in a policy environment that assumes the responsibility to be for the current level of service provision. It was clearly difficult for the Task Force to choose one of the approaches when it did not fully comprehend these implications of its choice.

The Task Force claims that a '"need-based" approach determines physician requirements consistent with the level of care that someone thinks people should have'. Although terms such as 'someone' and 'should' render this somewhat difficult to make operational, the description at least recognizes that the approach involves some judgments as to needed levels of service. But most of the major problems and pitfalls in this study may be traced, directly or indirectly, back to the next two sentences:

> A 'demand-based' approach ... determines physician requirements consistent with the amount of health care that people actually demand and receive. The demand- or utilization-based approach essentially tells you how many physicians will be required in the future if the present structure and policies of the health care system are maintained.[8] (p. 31)

In fact, this is a direct quote from the ADL report (p. 162 of the Task Force Report), reflecting an uncritical acceptance by the Task Force of the premises on which the consultant's work is based. This makes crystal clear the Task Force's view of a one-to-one relationship between demand and utilization, and justifies its subsequent use of the demand label on what is in fact a utilization-based study.

The Task Force notes that a need-based approach would take account of both over- and under-utilization. In fact, a true need-based approach would not consider utilization at all, unless utilization were to be used as a need measurement proxy. But the point that the existence of either or both of over- and under-utilization would undermine a utilization-based approach to estimating requirements is an important one, and a point that is acknowledged by the Task Force. Having dispensed with that acknowledgment, the Task Force plunges head-long into a 'demand- [read utilization] based' approach. To its credit, it does not attempt to claim that a need-based approach will be followed, and then proceed to urge utilization as a suitable need proxy. Rather, the determination of current and future needs is (predictably) dismissed as outside the terms of reference for the study (see previous chapter); a utilization-based approach labelled a 'demand-based' approach is adopted by default. Neither the Task Force nor ADL seriously addressed what would be entailed in a demand-based approach:

> The Task Force concluded that for current policy purposes the only useful analysis would be *demand-based*. It was necessary to determine the number of FTE physicians *required* to render the *services actually provided* in 1979-80 and to project the *requirement* for services to the year 2001 taking account of changes in the *age distribution* of the Ontario population and trends in *productivity* of physicians. The projection so obtained is an estimated [sic] of the future *demand* for physicians' services assuming continuation of the current health care system. (p. 32, our emphasis)

This summary paragraph re-emphasizes the equivalence in the minds of the Task Force of 'services actually provided' and 'demand'. It also hints at the two derivative future topics in this chapter – the treatment of productivity and selective quantification.

Having adopted and followed through on this utilization-based estimation of current requirements and projection of future requirements (as described in its Chapter III), the Task Force is careful to note some of the problems with this approach (p. 35):

> 1. The model assumes the estimated actual FTE OHIP physicians in 1979-80 is the number required to meet the demand ...
>
> 5. The age adjustment factor assumes no significant departure from current utilization patterns.

Of course there is no particular reason why we should want physician requirements to be based on demand. Patients not only may demand unnecessary care, but they are also in general incapable of demanding all necessary care. But the model used by the Task Force assumes (being a utilization-based model and assuming away over- and underutilization) that the available physician complement is equivalent to physician requirements. The assumption of no excess or under-utilization also allows the straightforward application of population projections to age-specific utilization rates for the purposes of estimating future requirements (as a function of future projected physician utilization). *This* despite scattered references to the fact that 'there is (or may be) considerable over-utilization or inappropriate utilization of physicians' services' (p. 31), and that 'costs are seen to be related to the number of physicians' so that 'the government cannot be satisfied to allow medical manpower numbers to drift on the vague promise that the supply will adjust to the need once reform has taken place' (p. 32).

Chapter III of the Task Force Report covers the quantitative stages of the analysis; Chapter IV discusses briefly some factors with the potential to alter future 'demand' (read requirements) (pp. 37-41). In that context, the Task Force concludes a half-page of discussion on new technologies by suggesting that 'technological evolution ... may have an impact on physician *demand* especially in relevant specialties. On the whole, it seems more likely that such impact will increase rather than decrease the *requirements* for physicians' (p. 40) (our emphases). Certainly the historical record would suggest that new technology increases aggregate utilization, and if utilization is being translated directly into requirements, then the second part of this quote is, if not correct, at least consistent with observed patterns of change and the approach to requirements adopted in the Report. The impact on quantities of care *demanded* (and therefore on the *demand* for physicians) is less clear. Patients do not normally contact the health-care delivery system demanding sonograms, CT scans, or bypass operations. Furthermore, it strikes us that any new technology that increases the demand for, or aggregate utilization of, physicians needs to be carefully evaluated from the perspective of its impact on health status – quality and extension of life.

But the major blunder in the chapter, and perhaps in the entire report, is to be found on pages 40-1. There we find the Task Force deliberating on *unmet needs*. Recall that this study chose to avoid a need-based approach as requiring effort outside its terms of reference. In employing the alternative, utilization-based approach, it acknowledged the implicit assuming away of both under- and over-utilization. But unmet needs have no place in either demand- or utilization-based analyses. The only possible consistent explanation would be that the Task Force was, in fact, using utilization to proxy need. If this were true (and all other evidence suggests it is not), why, then, do we find no discussion in Chapter IV of physician supply, or over-utilization (physician- or patient-induced) in a chapter ostensibly devoted to 'additional factors bearing on demand'? It comes as no surprise that the Task Force finds that unmet needs 'probably will increase the requirements for physicians' (p. 41).

Furthermore, the factors representing unmet needs are themselves a curious assortment:

- remote geographic communities
- specialty maldistribution
- shifting emphasis on prevention
- shifting morbidity patterns
- environment.

We have less trouble with the first, second, or last than with shifting emphasis on prevention or shifting morbidity. These two are problematic both in their content and in their implications for need for health care. A growing emphasis on prevention, lifestyles, and so on, need not necessarily represent a net addition to health-care needs. If lifestyle is important, if prevention is effective, perhaps we might at least hope that the additional service requirements attributable to extended life spans may be effected by reduced service requirements in the closer (and less heavily discounted) years (even if a shift in specialties or in the mix of health-care providers is required). Shifting morbidity patterns are, indeed, likely to affect the mix of health-care needs. All things being equal, whether they will increase or reduce the need for health care is not something the Task Force addresses or can claim to be able to answer. Furthermore, to claim in a discussion of shifting morbidity patterns that 'increasing life expectancy and improving survival rates may be the most important variables and these factors will lead to increasing demand' (p. 40) is to double count the effects of changing age mix (because this was one of the factors quantified in the ADL estimations).

Of course, even if the discussion of unmet needs were entirely plausible, its inclusion would no less highlight the major inconsistency in treatment of need and utilization throughout the Report.

The Task Force's admonition that different methodologic approaches are 'designed to answer altogether different policy questions' (p. 31) is, of course, never followed through at the stage of recommendations. We conclude this section by sharing the curious fourth recommendation of the Report:

> to not interfere further in policies affecting supply of physicians until there is clear evidence that the supply will not meet the demand or that it will exceed the demand. (p. 56)

Even ignoring our trouble with having supply sufficient to meet quantity demanded, it is hard for us to imagine how one could ever change supply policy if one creates the circularity of equating 'demand' with utilization!

THE IMPACT OF CHANGES IN PHYSICIAN PRODUCTIVITY

The ADL report applied four adjustments in converting current utilization patterns to future utilization estimates – general population, population age structure, female productivity, and hours worked. In this section we focus not on the specifics, but on the assumptions inherent in the last two of these adjustments. They are both ostensibly productivity adjustments: one to account for the possibility that an increasing proportion of female physicians will lead to increased requirements for physicians because of lower female productivity; the other to adjust for male physicians' expressed intent to work fewer hours, again presumably implying lowered productivity and increased requirements. They are also both inextricably connected to the need/utilization blurring, and it is that aspect of the issue, and its implications, that occupy us here.

There is a fundamental problem with the Report's assumption that reduced service provision or hours of work translates directly into reduced productivity and, in turn, into increased net requirements (requirements less available supply). The first link in the chain is the weak link. That reduced hours of work lead to reduced service provision leads to lowered productivity is an incontrovertible tautology, *if* the numerator of productivity is hours of work, or if the numerator is services and one further assumes a relatively constant time rate of service provision. The Task Force is certainly not the first to adopt this definition (Heins et al. 1976, 1977; Guzman 1982). Indeed, given its blind faith in service provision as a measure of requirements, one would have been surprised had productivity *not* been measured in terms of services rendered. But 'merely working longer hours or revising fee schedules so that what was previously one service is now two, are not phenomena that represent increased productivity. Spending less time than previously in delivering the same service with the same impact on patient health status *does* represent a productivity gain' (Lomas, Stoddart, and Barer 1985). The point is, of course, that reduced work hours, either generally or more specifically because of a shift in the sex mix of physicians, need not in and of themselves have a negative effect on future patient outcomes or health status. The choice of a utilization-based rather than need-based approach springs this trap, and makes possible conclusions such as that drawn by Moore (1982, p. 1181) that 'if the average work week of women physicians is 75 per cent of that of male physicians, an additional 24 physicians *must* graduate each year' (our emphasis) in Ontario.

In point of fact, evidence is now beginning to emerge that suggests ADL's second assumption, of converging male/female hours of work (p. 34), is the more appropriate (Curry 1984; *Medical World News* 1984). That scenario worked through by ADL eliminates any effect of changing sex mix on requirements by the year 2001.

Left, therefore, with only the general trend toward reduced work hours, the Task Force's conclusion that this will reduce productivity thereby increasing requirements is consistent, of course, only with the utilization-based approach operating under the assumption that all current utilization is appropriate and required. If, however, the current situation were one of excess supply and significant unnecessary utilization (in the sense of non-positive marginal productivity, when productivity is measured in terms of health-status impact), then reduced hours of work would not translate directly into either reduced productivity or increased requirements.

This is an important issue because, along with the arguable impact of an aging population (see the following chapter), the issues of reduced work hours and increased proportions of female physicians represent the major groundswells of self-serving calls for maintaining or increasing the numbers of physicians. Although we would not argue that current evidence is such as to refute any of these out of hand, the evidence seems to us at least equivocal, or, rather, the conclusions should not be drawn on the basis of assumption. The questions of impact are empirical; but correct interpretation of evidence will require careful cognizance of the manner in which impacts are measured. Furthermore, the implementation of policies based on the 'conventional widsom' may well preclude any opportunity to assess the validity of the alternative view. If physician supply is increased to ward off reputed productivity deficits, one never gets to assess the impact on health status of reduced aggregate work hours.

SELECTIVE QUANTIFICATION

The final general issue that we wish to address in this chapter is selective quantification. By its choice of variables quantified (i.e., built into the estimation of future supply and requirements) and not quantified (i.e., receiving off-hand qualitative attention only in Chapter IV, or no attention at all), the Task Force controls both the results of the empirical phase and the recommendation possibilities. We argue here that the variables quantified are all variables that serve to increase requirements (at least in the manner with which they are dealt by ADL), whereas most of the variables unquantified or ignored entirely would have the opposite effect. The result of this is a report that, both in tone and in substance, comes off as bound and determined to find a future shortage (or at least no surplus) of physicians. Starting from the premise of a current balance, the study then applies adjustments, all of which increase requirements in the future; this approach follows logically from a utilization-based estimation of requirements that views current utilization as indicative of current requirements.

The Report makes no pretence of doing otherwise. Chapter II concludes with the statement that:

> there exists the possibility of changes in the health care system which could modify and in particular reduce the need for physicians without diminishing quality. Some of these changes are potentially cost-saving. In Chapter IV, therefore, these options are identified as well as the likely direction of their impact on the requirement for physicians *without any attempt to quantify the consequences of their introduction.* (p. 25, our emphasis)

Thus, we find in Chapter III, and in the ADL report, that the population growth, the changing age mix of the population, and the two 'productivity' factors discussed above (female physicians and general hours of work) are the only factors built in to the quantitative estimation of future requirements, despite the Task Force's own admission that 'data are available on the *potential* effect of introducing innovations such as health maintenance organizations or nurse practitioners' (p. 32). We can only conclude that these 'potentials' were more potential than the effects of aging and 'productivity' change. It is true that in the absence of major change, phenomena such as population aging and increasing proportions of female physicians will almost certainly still occur. But surely in an analysis applying only those factors and finding a resulting potential shortage of physicians, the authors are duty-bound at the policy-recommendation stage to draw in quantitatively the policy alternatives to increasing supply.

In Chapter IV of the Task Force Report, the authors consider 'the potential for new developments to modify the demand for physicians' (p. 37). In the space of four pages, the Report 'deals' with 'new health care delivery systems', 'allied health personnel', 'new technologies', and (curiously) 'unmet needs' (pp. 37-41). In the first two cases, evidence on potential impact for physician requirements is cited. In fact, the ADL report includes a simulation of the impact of an HMO model for Ontario, and finds that current physician requirements could be reduced by about 20 per cent. It is interesting that this simulation departs from the link between utilization and requirements. Evidence on alternative systems and on allied health personnel suggests substantial scope for getting by with significantly fewer physicians with no reduction in quality.

As noted earlier, the impact of new technology has been to increase utilization. There is no good empirical evidence available on the likely aggregate impact of technological advance on physician requirements. Technology holds the potential of expanding the curative frontiers (thus increasing need, by our definition), or increasing the efficiency of current diagnostic and treatment regimens (thus decreasing need, by our definition). The aggregate impact of the two opposite forces is unclear.

But we do have pockets of evidence suggesting the potential for reduced physician requirements – computerized EKG screening for cardiologists, EEG reading for neurologists, computerized tomography for radiologists, machine interactive history-taking for GPs, and so on.

This is not an argument for quantitative inclusion of the impact of technology. There is as yet too little good evidence. But it is an argument against too hasty inferences or conclusions. To draw a conclusion that 'on the whole, it seems more likely that such impact [of technology change] will increase rather than decrease the requirements for physicians' (p. 40), apparently using a combination of observed increases in *utilization* and estimates by physician panels, seems to be begging the key question of what effect new technologies will have on the overall health of the population.

The final factor, 'unmet needs', drew a significant degree of our attention earlier in this chapter. There we noted our puzzlement with finding unmet needs considered in a study whose *modus operandi* resulted from a conscious choice away from a need-based approach. But the issue is equally appropriately considered as selective consideration. Estimating requirements based on utilization or servicing patterns tacitly ignores both under-utilization (unmet need) and over-utilization (provider- or consumer-initiated utilization unrelated to health-care needs). Yet in the discussion of 'additional factors bearing on demand', it is only the potential under-utilization that receives attention.

This asymmetric treatment of the relationship between need and utilization gives rise in turn to a schizophrenic treatment of the impact of physician supply on utilization. We noted earlier the introductory references to evidence suggesting at least correlations between supply and utilization. Curious indeed, then, is a Chapter IV in which physician supply is conspicuously absent in discussions of 'factors bearing on demand'. Although those correlations (evidence in fact suggests a causal relationship) are the cause of official concern such as that which motivated the Ontario Council of Health study, the Task Force conveniently ignores the issue. This strikes us as the single most remarkable irony within the report. This approach is entirely consistent with the decision to estimate requirements on the basis of utilization. But the Task Force leaves itself wide open by subsequently introducing the issue of unmet need. The Task Force's willingness to depart from its utilization base appears to be in direct proportion to the likelihood that such a departure will lead to increases in the estimate of future physician requirements.

CONCLUSION

The purpose of this chapter has been to review three fundamental and pervasive problems with the methodologic approaches adopted by the Task Force. We have argued that the Task Force caused itself major problems by insufficient attention to the distinction between demand, need, and utilization, and the implications thereof. By adopting a utilization-based approach to requirements estimation, without apparent cognizance of the attendant assumptions and implications, the study labours under biased and inconsistent treatment of issues such as productivity and under- and over-servicing. The approach, which effectively precludes the existence of a current surplus of physicians, also limits the likelihood of policy prescriptions that address the current policy concerns.

In the following chapter, we narrow our focus in examining detailed methodologic and conceptual problems and errors, both within and outside the boundaries of the three general issues dealt with above.

4

The view from inside: analysis of quantified projections

We analyse the specific data and assumptions incorporated into the calculations of, first, physician supply and, second, physician requirements. Future supply appears to be an underestimate of what will likely be the case, although the erroneous inclusion of expected reduced hours of work on the requirements rather than supply side counteracts this underestimation. Future requirement, even assuming continuance of present delivery arrangements, appears to be an overestimate. Therefore we place little confidence in the Task Force's conclusion that we may be heading for a physician shortage by 2001. We highlight the absence of ranges and sensitivity analyses in the estimations, the failure to maintain internal logic and consistency in what is included on the supply and requirement sides, and the omissions in estimation consequent to using unmodified utilization data. Finally, we conclude that the quantified estimates of the Task Force may actually detract from our current pool of physician-manpower knowledge in Ontario.

In this chapter we explore the conduct and internal logic of the Report's chosen utilization-based 'demand' methodology. We have already discussed the limitations of this methodology relative to the alternative of a need-based approach. We now review how the report dealt with the numerous measurement problems that confront investigators using any method in which specific values (or even ranges of values) must be placed on physician full-time-equivalents, hours of work, productivity, and so on.

However, before we look at what *was* measured, a brief comment is in order on what *was not* measured. The Task Force failed to adjust current utilization for components that are known not to contribute to health outcomes or that could be provided more efficiently. In its introduction to the Task Force Report, the Council defends the decision not to adjust current utilization data for these factors on the grounds that it 'was found not to be feasible given the limited resources, state of the art and time available' (p. 12). It would appear, however, that it was overestimating the size of the task (which is, nevertheless, appreciable) because it believed that 'little quantitative data are available' (p. 12). This latter statement is not supported by a comprehensive review of the literature.[9] Such a review would have revealed, first, several estimates of the effects of alternative delivery systems on requirements for physicians and on the utilization of physician services (Mason 1972; Geomet Inc. 1974; Scitovsky and McCall 1976; State of Michigan 1981). Second, it would have yielded estimates of the potential of allied health personnel in reducing physician requirements by altering the mix of personnel deployed in medical service delivery (Cassels-Record 1981; Lomas and Stoddart 1982b). Finally, the evidence on the extent of surgical overservicing (Dyck et al. 1977; Roos et al. 1977; among others) might have been applied as one modification to a straight application of current utilization as equivalent to current physician service requirements. Data continue to accumulate in these areas (Lomas and Cushman 1984; Wennberg 1984). Needless to say, as with all forecasting exercises, the data should be used with appropriately wide confidence limits; but the data should be used. As we will see later, the Task Force was willing to enter equally equivocal forecasts of physician work hours (and as point estimates *without* appropriate confidence limits), while rejecting inclusion of estimates of the factors described above.

In concert with all attempts to plan for net future physician requirements, the Task Force had to answer four central questions (see also Figure 2). On the supply side:

1 How many physicians were there in the base year (in this case, fiscal year 1980/1) (hereafter we use the calendar year to denote either calendar or fiscal year)?[10]

2 How many physicians are there likely to be, given a reasonable set of assumptions, at some specific target date(s) in the future (in this case, 1991 and 2001)?

And on the requirements side (or what the Task Force deemed the 'demand' side):

3 How many physicians were actually required in the base year?

4 How many physicians will be required, given a reasonable set of assumptions, in the specified target year(s)?

The task is then to match the answers to questions 2 and 4 and decide, on the basis of this, whether current policies should be adjusted to compensate for potential discrepancies between supply and requirements in the future.

The data analysed to answer the four questions, even when analysed within the narrow framework of extrapolating unmodified current utilization levels into the future, may produce a variety of answers that will depend not only on which variables are included, but also on how those variables are measured and how they are assumed to change in the forecasted future. We have already spent time in previous chapters exploring the nature of the variables that the Task Force chose to include or exclude in answering the four questions. We will now examine how the variables that were included were measured and how they were assumed to change. The potential variability that can be found in the interpretation of such data was described in 1970 by Hansen, who, after reviewing six US forecasts of 1975 physician supply that nearly all used the same original data sources, concluded: 'Their results range so widely that it is difficult to know just what to expect by 1975 ... It is difficult to reach any conclusion other than that the projections are confusing and contradictory' (Hansen 1970).

ESTIMATING THE SUPPLY OF PHYSICIANS

Establishing current supply

The first question to be answered by the Task Force – how many physicians were there in Ontario in 1980? – appears simple enough to answer only for as long as it takes to scratch its surface. It immediately breaks down into a series of further questions:

- Whom do you count?
- How do you count them?
- How do you assign them to specialties?

The last of these questions, on specialty allocation, was not addressed by the Task Force, which directed its consultants 'to limit [their] attention to the *aggregate* supply and demand of physicians' (p. 149), thus avoiding all the potential difficulties of accurately assigning physicians to the specialty areas in which they actually practised (as opposed to the areas in which they were qualified). The magnitude of this difficulty is hinted at by a recent analysis of national physician data-banks that discovered

> marked differences ... particularly in the specialist segment of the physician population. Such differences were found to be significant in relation to 21 of the 36 specialties [with counts based on the specialty in which the physician was certified being as little as one-half of, and as much as two-and-one-half time as large as the 'corresponding' counts based on the field] in which he/she was actually practising. (Giles 1984)

The Task Force was therefore spared these problems, and left to decide only in the aggregate who to count and how to count them. Of course this makes significantly more difficult any effort to estimate net requirements by specialty, something that would seem essential to providing policy advice on residency posts!

Deciding whom to include in any aggregate physician count is complicated by the variety of activities in which physicians engage. In addition to physicians primarily providing patient care, there are physicians-in-training (interns and residents), administrators, teachers, researchers, company physicians, medical officers of health, and so on (Barer, Wong Fung, and Hsu 1984). The Task Force decided to count only 'physicians engaged in patient care',[11] because 'this is the key relationship from the standpoint of medical manpower policy' (p. 26). This decision on whom to count in supply estimations automatically meant that requirement estimates could be restricted to patient-care physicians alone; such comparability is required if the final stage of matching projected supply and projected requirements to arrive at conclusions of shortage or surplus is to be consistent. But this approach is, nevertheless, incomplete.

Unfortunately, the Task Force (and ADL) erred in an important way in translating their intention into practice. The error appears to be one of convenience because of the lack of readily available time-series data on a sizeable portion of the physicians engaged in patient care.

The Task Force did use 1980 data to arrive at a sum of 14,142 for all forms of FTE patient-care physicians (Table 3, p. 64). These comprised: those billing OHIP; psychiatric-hospital physicians; those in Health Service Organizations; those operating under alternate-payment schemes; those in children's facilities, mental-retardation centres, and public-health departments; and those salaried in public hospitals or federal hospitals. All these groups, however, were not included in the supply-estimation model. The ADL supply-estimation model includes only those physicians billing OHIP and an FTE consideration for the interns and residents (i.e., fee-for-service patient care) because 'similar estimates [for the other forms of patient-care physicians] could not be developed for prior time periods because the necessary data were not available' (p. 153). Thus, the chosen definition of supply might have more accurately read 'physicians engaged in patient care *and who can readily be counted over time*', i.e., physicians billing OHIP, and a portion of interns and residents. The additional 'miscellaneous' patient-care physicians, beyond this restricted figure, would have increased supply in 1980 by an appreciable 28.4 per cent (11,016 to 14,142). The exclusion of the non-fee-for-service patient-care physicians is problematic because it is not difficult to imagine situations in which, as a proportion of fee-for-service physicians, this group becomes significantly smaller or larger, with the consequence that the projections of supply would be either an under- or over-estimate.[12]

It would appear that the Task Force's decision on whom to count was strongly determined by its choice of a utilization-based analysis. The utilization base was the OHIP data files, and thus those billing OHIP became the 'sample of convenience'; the stated focus on 'patient-care physicians' turns out to be secondary, given the exclusion of the significant number of non-fee-for-service patient-care physicians. It might have been more advisable to either estimate supply of all physicians aggregated, not only across specialties, but also across all occupational categories, or estimate supply for each of the disaggregated categories. The chosen approach gives only a limited, and potentially distorted, picture of physician supply.

In deciding how to count the designated physicians – our second question – there was once again a panoply of choices. Some investigators (COFM 1981) have used a count of registrants with the provincial college (CPSO); however, it has been more usual to construct a measure of full-time-equivalent physicians. The Task Force chose to use an FTE measure; this therefore precluded use of the CPSO registry because it takes no account of the practice status of physicians, and even includes those who have died, retired, or no longer reside in the province (Moore 1982).[13] The FTE measure chosen relied on OHIP billings data. The Task Force considered *any* physician with billings in excess of $80,000 in 1981 (and appropriately deflated billings in prior years) to be one FTE; other physicians grossing below this figure were considered to be part of an FTE in proportion to their billings.

There are any number of other potential definitions of an FTE physician (Barer, Wong Fung, and Hsu 1984), all very much variations on a similar theme, but none with a particularly clear advantage over others, except in relation to the specific use intended for the figure. For instance, Weiler (1982) was arbitrating a dispute between the government and physicians over the size of incomes, and was therefore not interested in defining portions of an FTE; he used the 30th percentile, or $55,000 in 1981, as a threshold above which he would start counting to establish an annual OHIP income for an average physician in full-time practice.

In a manpower-planning exercise, however, there should be greater concern about counting fractions of an FTE because, whether a physician is full-time or not, he/she is clearly contributing to patient care. In this regard, the relatively high threshold value of $80,000 chosen by the Task Force is defensible on the grounds that it had to represent reasonably the OHIP income of the average FTE physician in patient care, i.e., it was not a value below which you ignored physician activity. It is not defensible, however, that a figure that was arrived at only after 'considerable discussion' (p. 152) between ADL and the Task Force should have been entered into estimation models without appropriate sensitivity analysis. How large is the difference in FTE physician supply if a $70,000 or a $90,000 threshold is used for 1981? Furthermore, the credibility of the aggregate $80,000 threshold value is also called into question because of the absence of differential thresholds for at least the two categories of specialists and general practitioners, if not for each specialty individually. For instance, data over the years have consistently demonstrated that general practitioners gross 75 per cent or less of the billings grossed by specialists (Wolfson, Evans, and Lomas 1980; Barer, Wong Fung and Hsu 1984).

The absence of any sensitivity analyses on differential thresholds is also regrettable because of how the OHIP-FTE measure was used. It was constructed as a physician 'count' in order to relate historically the number of FTE patient-care physicians to the number of physicians on the CPSO registry. This was necessary because there were no data for OHIP patient-care FTEs on any of the variables that would be used to model supply projections later, i.e., rates of immigration to the province, attrition rates, percentages of Ontario graduates registering in Ontario, and so on. Yearly data on these variables would only be modelled and projected into the future using the CPSO registry; the historical relationship (1972 to 1980) between CPSO numbers and the OHIP-FTE numbers was then used to extrapolate a relationship between them into the future and thereby translate modelled CPSO numbers back into estimated OHIP patient-care FTE numbers. Thus, it is quite possible that an alternative overall threshold or the addition of differential thresholds could not only have produced different absolute numbers of FTEs in any particular year, but also have changed the nature of the historical relationship between those numbers and the numbers on the CPSO registry.

In fact the Task Force, using its uniform $80,000 threshold, found that FTE-OHIP physicians were a steadily rising proportion of CPSO registrants between 1973 and 1980, from 65 per cent to 70 per cent (Table 4, p. 177). Therefore its model assumed that this relationship continued, such that by 2001 OHIP-FTE physicians were 75 per cent of CPSO registrants. If our suggested sensitivity analyses had altered historical trends so that by 2001 the adjustment were not 75 per cent but (say) 5 per cent lower or higher, then the OHIP-FTE physician supply in the 'base model' would, in 2001, have taken on potential lower or higher values of 12,800 or 14,600 respectively, instead of the Task Force's figure of 13,700.

There were, therefore, a number of opportunities for the Task Force to have improved upon the single-value estimate of 11,016 to answer how many physicians there were in Ontario in 1980. Some of the errors may almost cancel each other out, but others, such as the unknown historical effects that might be revealed by sensitivity analyses on FTE dollar thresholds, have the potential for compounded error as consequences reverberate through future projections. The direction of that error is, however, not clear.

Projecting future supply

Using this base-year figure of 1980 supply, the next question is: how many FTE physicians in patient care are there likely to be in Ontario in 1991 and 2001, given the Task Force's assumption of 'continuance of the arrangements in the existing system' (p. 10)? To perform this forecasting task, decisions had to be made about what will add to the physician supply and what will reduce the supply between the base year and each of the target years. Furthermore, a method had to be found to estimate the likely values of each of these variables.

Table 1 describes the addition and subtraction variables chosen by ADL and the Task Force. The future values of these variables were estimated for a base model using data on the historical relationship (1972-80) between each variable and the population (for the number of medical-school graduates), the size of the medical schools' exit class (for the number of Ontario graduates registering in Ontario), and the size of the total CPSO register (for both the number of non-Ontario graduates registering in Ontario, i.e., immigration, and for the attrition rate from death, retirement, and emigration). In addition to the base model generated by these historical relationships, seven other projections were simulated using values for the addition and subtraction variables established by the Task Force – values that did not follow automatically from the historical relationships. Furthermore, there were two other scenarios in which fee levels in Ontario rose relative to other provinces, increasing both the proportion of Ontario graduates actually registering in Ontario and the rate of attrition (but decreasing, strangely enough, the number of non-Ontario graduates registering in Ontario). All of these estimations were performed on the CPSO registry and then translated, as described in the previous section, into numbers of FTE-OHIP practitioners engaged in patient care.

Historical trend relationships that are not supplemented by common sense are rarely the most appropriate way to estimate future numbers, especially if the predicted future relationships between variables do not appear to conform to likely future scenarios. The Task Force recognized this for one of its relationships – the proportion of Ontario graduates registering in Ontario – which historical trends predicted would fall steadily from nearly 80 per cent in 1981 to 51 per cent in 2001. The Task Force 'judged this to be improbable given the apparent burgeoning surplus of physicians within the United States and throughout Canada' (p. 157), and therefore substituted a constant of the average rate for 1980 and 1981 – 76.8 per cent – for the histori-

TABLE 1
Variables used in the base-projection model and what determined their future values

Variables	What they respond to in supply-projection model
Additions	
1 a) The number of Ontario medical-school graduates	• Historical number of graduates • Population
b) The number (proportion) of Ontario graduates registering in Ontario	• Historical proportion of Ontario graduates registering in Ontario[a] • The number of Ontario medical-school graduates (1a) • Level of fees in Ontario relative to other provinces
2 The number of non-Ontario graduates registering in Ontario	• Historical number of non-Ontario graduates registering in Ontario • Physician-to-population ratio in Ontario
Subtractions	
3 Attrition rate – composite of deaths, retirements, and emigration	• Historical attrition rate • Level of fees in Ontario relative to other provinces

[a] In fact, the base-model relationship was not determined by the historical data for this variable because the Task Force imposed a value that it considered more likely. (See text for further explanation.)

cally projected values. We would not argue with this substitution of common sense for the computer's sense; we would, however, argue with the fact that this was the only relationship in which such an adjustment was made for the base-model results. In addition, a model generating predictions so far removed from reasonable expectations suggests the need for a hard look at the explanatory relationships on which the model is based.

There were certainly other places where such adjustments were called for because of the strange contradictions generated by the computer model. Paramount among these was the anomaly that immigration to Ontario from other provinces (non-Ontario graduates registering in Ontario) was predicted to fall sharply from 1.9 per cent of CPSO registrants in 1980 to 1.1 per cent in 2001. Surely, if Ontario graduates are staying home because there are surpluses everywhere (except in Ontario, if the Task Force's ultimate conclusions are to be believed), then increasing, not decreasing, numbers of non-Ontario graduates would be moving into Ontario. Otherwise, where will all the surplus physicians from elsewhere go? This reality is supported by CPSO data that showed a large, 33 per cent increase in 1980 immigration to Ontario (from 292 in 1979 to 389 in 1980, Table 4, p. 65). If other sites *are* more attractive than Ontario, despite the surpluses, would they not also be more attractive to Ontario graduates, thus negating the Task Force's original adjustment that kept larger proportions staying home? Clearly, if it was believed that surpluses outside Ontario really will exist, immigration will not decline sharply; in fact it may well rise.

Despite this, in only two of the nine simulations do we see *any* increase in the number of immigrants to 2001, and in none of them do immigrants increase as a proportion of total registrants. (It should be remembered that 'immigrants' in this case includes those from other provinces as well as those from other countries.) The situation gets even stranger in the two simulations involving relative fee increases in Ontario: in these cases, immigration drops off to zero by 1992 (pp. 186-7)! This occurs because the historical trends model has physicians already in Ontario responding more to fee levels than to physician-to-population ratios, but physicians outside Ontario looking at only the physician-to-population ratio and ignoring fee levels in deciding whether to locate in Ontario. These are clearly instances where common-sense adjustments to the values for immigration would have increased the credibility of the projections, especially given the observation by the Task Force that 'supply of physicians is highly sensitive to this [immigration] variable' (p. 29). We reiterate that in none of its simulations does the Task Force ascribe a value to the immigration variable that increases its effects relative to the base year of 1980; and in the Task Force's 'most likely' supply projection (Table 5, p. 66), it fell as a percentage of CPSO registrants from 1.9 per cent in 1980 to 0.5 per cent by 2001. The overall effect of this is a likely underestimation of physician supply in 2001.

It is not only the immigration variable that performs somewhat strangely in the model. On the subtractions side, attrition (including deaths, retirements, and emigration) is thought to remain constant at 2.74 per cent per annum, except in the two scenarios involving relative fee increases, wherein attrition is reduced. Thus, the Task Force assumes either that the age structure of the physician supply remains constant along with emigration (an unlikely situation given the unusually large influx of new physicians in the 1960s and 1970s), or that emigration rates coincidentally adjust to compensate for changes in the rate of deaths and retirements resulting from the changed age-structure of the supply. Because of the relatively young physician supply in the projection period (relative, that is, to the historical period of 1972-80), attrition from death and retirement is likely to be lowered up to 2001, after which time it is likely to take a leap upward. Furthermore, the Task Force had already assumed that new Ontario graduates will be less likely in the future to leave Ontario because of the surpluses elsewhere. It would then seem to follow that emigration of currently practising physicians will be lower because established physicians would be even less likely to move than 'new', more mobile physicians. The attrition rate is therefore most probably an overestimate, thus again underestimating projected supply in 2001.

In this case, it would surely not have been beyond the resources of the Task Force to look at the age structure of the current and projected supply and make adjustments accordingly to its constant attrition rate. Additionally, it would have merely maintained the internal logic of its model to reduce the attrition rate because of reduced emigration. Part of the problem lies in its specification of a single subtractions variable encompassing deaths, retirements, and emigration. ADL defended this, stating that 'the "subtractions" variable could not be disaggregated into its components ... for years prior to

1979. Furthermore, the disaggregations available for 1979, 1980 and 1981 appeared to be unreliable' (p. 154). We found this statement to be confusing because within the covers of the publication (appended to the Phase I report) was a table disaggregating attrition rates into 'emigration' and 'deaths and retirement' from 1977 onward (Table 10, p. 137). These figures did not 'appear unreliable' to us; they also confirmed our feeling that the attrition rate from death and retirement was falling, down from 2.4 per cent in 1977 to 1.8 per cent in 1980.

There appear, therefore, to have been problems in how the Task Force and ADL chose to specify both the 'addition' and 'subtraction' variables, all of which had the tendency to underestimate supply in 2001. Despite this, their 'most likely' estimate (a projection of their interpretation of historical trends, except that the number of Ontario graduates was held constant at just above 1980 levels) still produced an 'improvement' in the base-year physician-to-population ratio of 'OHIP FTEs in patient care', from 1:777 in 1980 to 1:723 in 1991 and 1:700 in 2001.

Before leaving consideration of these projected supply figures to analyse the companion requirements (or demand) estimates, an apparent confusion by the Task Force of supply and demand factors should be highlighted. Because the final ratios quoted above are full-time equivalents, they should presumably have taken account of all the supply factors that are likely to bear on what constitutes an FTE in the future. Unfortunately, they have not. Two of the adjustments on the requirements side – changes in the expected hours of work of a future FTE physician and the effects of an increased proportion of female physicians who are all expected to work fewer hours than males – are not, in fact, 'requirement' factors. The two variables are merely factors that might change the effective supply of *full-time-equivalent* physicians, and therefore rightfully belong in the Task Force's estimations of future supply. They should have been entered as 'subtraction' variables if, as the Task Force believed, they would decrease the total effective supply available to meet demand. The error makes little difference to the final judgement of whether there will be future shortages or surpluses – in one case you subtract from supply, in the other you add to requirements. If the Task Force is correct in assuming that the two factors will decrease the effective supply of FTEs, however, then its absolute figures of projected supply cannot be used, except in comparison to its erroneously specified requirement figures, because they are overestimates. Then again, given the tendency in its supply projections to *under*estimation, perhaps the final supply figures are, as absolute values, in the right ballpark! For the sake of critical consistency, we have reserved comment on the Task Force's measurement of these two misplaced supply variables until we encounter them in the upcoming section on estimating the requirement for physicians. Meanwhile, the error serves to underline once again the confusion of the Task Force (and ADL) about what constitutes a 'demand' methodology.

ESTIMATING THE DEMAND (REQUIREMENT) FOR PHYSICIANS

Establishing current requirement

We have already discussed in Chapter 3 the major shortcomings of using utilization data to represent demand (which in this exercise was taken to be the requirement) for physicians. We will not describe again the additional potential components beyond demand requirements that are contained in utilization data; but this should be kept in mind as we analyse the specific methods adopted by the Task Force to translate utilization data into requirements.

The Task Force accepted the 1980 utilization data from OHIP files as reflecting the provision and receipt of required services; thus, the task became one of (a) applying appropriate practice standards to determine how long it should have taken to provide those services, and (b) applying appropriate norms of how many total hours each year a physician should spend providing patient services. From this it can be seen that the 'requirements' stage of the exercise has a significantly larger normative component than the 'supply' stage – what *should* service time be, what *should* total physician work hours be.

The normative values for service time were obtained from the 1975 deliberations of the Requirements Committee of the National Committee on Physician Manpower (Canada 1975), and applied to the OHIP data after suitable adjustment to match the method of data presentation adopted by the National Committee. By multiplying the 'required' service times for each of thirteen categories by the number of 1980 OHIP services in each of the categories, a figure for the total required hours of care in Ontario in 1980 was obtained (26,288,123 hours, p. 164). Given that one can dispute any such normatively defined figures on time per service, the Task Force's selection of

National Committee figures was probably no worse nor better than the alternatives. The figures used did include:

> both the *direct* and *indirect* service times, in minutes, for each service category. The direct service time is that required for actual provision of the service, and the indirect service time is that required for other activities associated with delivery of the service (e.g., waiting, telephoning, writing reports or reading x-rays). (p. 164)

Some might argue that service times deemed appropriate in the early 1970s would no longer be appropriate; but, apparently, a recent manpower committee of the Royal College of Physicians and Surgeons, upon reinspection of the estimates, felt that they had largely retained their validity.[14]

Having established the numerator, the Task Force had to decide upon a denominator – how many hours per year an FTE physician should spend on patient care – to estimate base-year physician requirements. It is at this juncture that the Task Force's chosen values become more contentious. The first point of importance is that, in contrast to time-per-service values, the physician-work-hours figure introduced at this stage was *not* a chosen optimal value obtained via expert consensus panels, literature reviews, or any other mechanism. Despite the fact that optimal requirement was ostensibly under investigation, the Task Force decided to use reports of physicians' 'actual average number of hours worked per year' (p. 164). It was not until this requirement became projected into the future that adjustments were made to reflect what was considered 'the optimum average workload for the kinds of physicians billing OHIP' (p. 166) (although, as we noted above, even then this adjustment rightfully belongs on the supply side). Thus, current requirements were calculated on the basis of 'what is'; but future requirements were premised on 'what should be'. This is a sure-fire way of ensuring that future requirements will exceed current requirements!

Furthermore, the figures that they chose to use, which would be used again in an adjusted fashion as part of the future requirements calculation, were specialty-specific self-reported hours of work from a 1980 survey by the Ontario Medical Association (OMA) (Holmes 1982). Such hours-of-work data are usually reported in two forms: hours spent in patient care, and total hours on professional activities excluding on-call time. The Task Force inappropriately used the latter of these two figures (2,565 hours per year), although its utilization calculations (which were OHIP based) required use of the patient-care figure – a significantly lower 2,225 hours. A further source of overestimation bias (in hours of work, *not* in requirements) was the self-report nature of these OMA figures. Table 2 presents data on physician work hours from a number of other sources that are all below the OMA figures. Admittedly, all of these figures are not directly comparable (some are for years before 1980, others apply to Quebec, not Ontario); but they leave little doubt about the direction of error in the figures used by the Task Force. Self-report OMA hours of total work are a significant overestimate of physicians' actual hours of patient care. This would appear to be another example of a situation in which sensitivity analysis employing a range of figures was required. For example, the Task Force estimated that physician requirement in 1980 was 10,249, using the 2,565-hours figure; even if the appropriate OMA patient-care figure of 2,225 hours had been used, then physician requirement in 1980 would have been 11,815 – fully 15.3 per cent more. If the more reliable[15] Wolfson, Tuohy, and Shah (1978) figure had been used, the 1980 requirement would have turned out to be 11,980.

The result of these errors is a major underestimate of requirements (but only as defined by Task Force criteria) in 1980. This methodologic underestimate was partially (but only partially) offset by the decision to adopt the (higher) estimated actual *supply* figure of 10,742 as the base for the requirement projections, because 'the estimated actual number is 4.8% higher than the estimated required number ... Given the room for error in all the estimates, [it] constitutes a basis of confidence that the estimated actual FTE physicians in 1980 (i.e. 10,742) is an acceptable measure of requirements in that year' (p. 33). We can only comment that this decision seems very much in line with the Canadian tradition of supply projections as planning (Lomas, Stoddart, and Barer 1985).

Projecting future requirement

With the 1980 supply figure as the base, the Task Force then adjusted this 'requirement' for four factors to arrive at future requirement – population growth, population aging, female productivity, and reduced hours of work (Table 13, p. 74).

TABLE 2
Physicians' hours of work from a variety of sources

Survey	Year data collected	Hours of work/year Patient care	 Total hours (exc. on-call)
OMA Survey, Holmes (1982), Ontario	1980	2,225 +[a]	2,565
Wolfson, Tuohy, and Shah (1978), Ontario	1976	2,194	2,333
Ryten (1984b), Quebec			
General practitioners	1983	2,160	2,304
Specialists		2,083	2,506
Taylor, Stevenson, and Williams (1984)[b]			
Canada[c]	1982	n/a	2,379
Ontario		n/a	2,432

a Because the OMA reported hours on only a specialty-specific basis, we calculated average physician hours in patient care across all specialties using the same technique used by ADL for total hours (see Table 9, 190).

b Figures were reported as hours per week and therefore converted to yearly totals by multiplying by 48.

c Based on five provinces – Nova Scotia, Quebec, Ontario, Alberta, and British Columbia.

Adjustment for future population growth was a straightforward percentage increase in base-year requirement that paralleled the projected percentage population increase by 1991 (8.5 per cent) and 2001 (11.5 per cent). Most population projections employ a range of values depending on estimates of migration, fertility, and mortality, and, again, it would have been useful to see sensitivity analysis by the Task Force on this factor. Instead, it used single values that tend to mislead in their implied level of accuracy.

More problematic, however, was the population adjustment to take account of the increased proportion of aged in the population, i.e., the changing age-sex mix. The Task Force made the assumption, made by others previously (United States 1980; COFM 1981), that, because we see more utilization of physicians' services in older people, then total requirement for physicians' services will increase as the population gets proportionately older. Thus, current (1980) OHIP utilization data by five-year age-sex categories were imposed on the future (older) age-sex structure of the population to arrive at the expected increases in utilization in 1991 and 2001 owing to a proportionately older population.

The logic of this adjustment is at first appealing. It tends, however, to ignore *why* the population is getting proportionately older. One important reason would appear to be that the population is getting healthier, or at least has lower age-specific death rates; and one might therefore question whether present cross-sectional utilization patterns of the elderly will automatically be mirrored in the future. Fuchs (1984) has recently reviewed this situation using Medicare data in the United States, and his research is worth quoting at length. He points out that:

> Health-care spending among the elderly is not so much a function of time since birth as it is a function of time to death. The principal reason why expenditures rise with age in cross-section (among persons aged 65 and over) is that the proportion of persons near death increases with age ... As age-specific death rates fall over time, there will be fewer people in the last year of life in any age category, and this will tend to reduce age-specific health care expenditures. (p. 151-2)

He then proceeds to calculate an age-sex-specific utilization measure (using expenditure data), which is adjusted for age-sex differences in death rates. By adjusting the Medicare data for survival status, he 'eliminates most of the age-related increase in expenditures, especially the very high expenditures in the group aged 85-and-over'. He also notes that the excess of male over female expenditures at any given age was almost eliminated because 'the only reason why older men use more medical care than older women at any given age is because a higher proportion of the men are in their last year of life'. He then proceeds to point out that:

> This observation would be of little consequence if mortality rates were constant over time, but they are not. Between 1965 and 1978 the age adjusted death rate of persons aged 65 and older fell from 65 per 1,000 to 53 per 1,000. If age-specific death rates continue to fall at this rate, 75 year olds in 1987 will face the same probability of death as 71 year olds faced in 1965. (pp. 151-4)

Fuchs's demonstration that age-specific utilization is more dependent on mortality status than years-from-birth should not be taken to mean that *no* adjustment should occur for future population aging. Rather, it means that if cross-sectional, current utilization data are merely extrapolated into the future, all else equal, it will result in a significant overestimation of the expected utilization increase. We cannot say with confidence how large this overestimate was in the Task Force's OHIP-based calculations; but we do note that its adjustment increased physician requirements by 9.2 per cent for 2001. Even halving the adjustment would reduce the estimated requirement in 2001 by about 600 physicians. This is another example of the problems encountered when utilization data are used unquestioningly without paying attention to the actual need (or real demand) for those services.

The last two adjustments are made to take account of expected changes in the hours of work of individual physicians and of the physician stock in total. It was thought that the former would change because 'It was submitted to this Task Force repeatedly that recent graduates intend to work fewer hours than their older colleagues have worked' (p. 34). Changes in the latter were likely not only because of the former, but also because 'An increasing proportion of medical school graduates are female [and surveys] show that currently female physicians work an average of 75% of the hours worked by male physicians' (p. 34).

The Task Force provided two scenarios, both of which involved overall reductions in hours of work by physicians. In the first scenario, men reduced their hours of work by the year 2001 to 2,243 hours per year (87.5 per cent of average 1980 hours), and women reduced hours to 1,682, or 75 per cent of male hours (65 per cent of average 1980 hours). In the second scenario, men still decreased their hours to 2,243, but women wiped out the hours differential and were thought to be also working at 87.5 per cent of 1980 values, i.e., 2,243 hours.

Unfortunately, we could find no evidence (other than the hearsay reports quoted by the Task Force) that suggested unequivocally a historical trend toward shorter working hours for physicians – desired or imposed.[16] There is some evidence to support the shorter work hours of women relative to men (Holmes 1982; Curry 1983; Taylor, Stevenson, and Williams 1984), although whether this relates to life-cycle hours or yearly hours is still not entirely clear.

Nevertheless, the Task Force applied its two scenarios of reduced work hours to its base-year hours of work (the OMA actual *total* hours-of-work figure of 2,565) and, combining this with the population adjustments, arrived at two values for requirements in each of 1991 and 2001. There are thus counterbalancing effects of using the inflated OMA figure. In the first instance, it reduces the current requirement figure, but then, because there are more hours to be 'dropped' by physicians to arrive at the optimum hours-of-work figure, it increases the future requirement. In fact, surprisingly, if the more appropriate OMA patient-care hours-of-work figure had been used, there would have been no necessity to make *any* adjustment to account for decreasing hours of work to an optimum, because the OMA figure of 2,225 hours per year was already below the Task Force's defined optimum of 2,243 hours! Thus, if we recalculate the Task Force's estimates of future requirement (Table 13, p. 74), using the 2,225-hours figure throughout, we find that in 2001, with female productivity remaining at 75 per cent of men's, the requirement is 14,930 physicians (Task Force estimate was 15,529); with female productivity converging to men's, the requirement is 14,004 physicians (Task Force estimate was 14,565).[17] Therefore, assuming all other adjustments to be correct, the net effect of overestimating current physician work hours is to overestimate the future requirement figure by at least 4 per cent.

If the overestimate owing to use of inaccurate work-hours data is combined with the likely overestimate owing to the nature of the aging-population adjustment, a significant total overestimate in future physician requirement must certainly be the result. This overestimation of future requirement occurs despite the fact that current requirement is underestimated, and without even taking into account the additional potential for reduced requirements of the 'changed delivery system' factors not explored by the Task Force. The fact that current requirement calculations with appropriate work-hours data produced a requirement figure that was 15 per cent higher than the Task Force's current actual supply (i.e., we require *now* 15 per cent more physicians) may be a strong indication that the entire requirement calculation should be taken with a large grain of salt. Although we would definitely agree with ADL's statement that 'the results are most reasonably viewed as being "ballpark" estimates', we would have to disagree with the conservative confidence limits it placed around the 'ballpark': 'five or even ten per cent variances are possible' (p. 35). Far larger variances are surely possible, even within the confines of its extrapolated status quo.

COMPARING PROJECTED SUPPLY AND PROJECTED REQUIREMENT

To make the comparison between projected supply and requirement, the Task Force established ranges for each in 1991 and 2001. The range for supply was bounded at the upper end by the simulation assuming relatively high immigration, at the lower end by the simulation assuming a 15 per cent reduction in new graduates; the 'best estimate' was based on new graduates continuing to number about the same as now. The requirement range was established by averaging the results from the two productivity adjustments for the best estimate, and then placing a 10 per cent confidence limit around this (see our Figure 3). How much confidence should we place in the conclusion, based on a comparison of these ranges, that 'the best guess is that we may be heading for a shortage [of physicians] by 2001' (p. 36)?

There are so many misspecifications in the supply and requirement models that it is difficult to disentangle their sometimes counteracting effects. On balance, however, it would appear that future supply was underestimated and future requirement was overestimated; this being the case, re-specified data along some of the lines suggested earlier in this chapter would likely result in a conclusion of balanced requirement and supply in the future, or even a physician surplus. We should therefore review carefully the policy implications that the Task Force derives from its somewhat tentative suggestion of a future shortage. This we do in the next chapter.

We have been highly critical of the Task Force's (and ADL's) methodology and calculations. In defence of the Task Force, the job of criticizing was made easy because it was after all a forecasting exercise with inevitably debatable judgments and arguable normative assumptions. What we have tried to do, however, is highlight three things.

First, although the utilization-based methodology is initially attractive because of its apparent simplicity, the methodology itself ignores some important influences on supply and requirement, and this can lead to unhelpful and even misleading results. To account for all the influences on utilization, i.e., to use modified utilization data that take account of unneeded or induced or replaceable physicians' services, requires far more effort than was expended on this exercise, and would then be in the realm of the more challenging need-based methodologies.

Second, we have tried to show that to maintain the internal logic of even the utilization-based methodology is crucial, but difficult. There were a number of places where the Task Force failed in this regard: counting FTEs on the basis of earnings on the supply-side, but on the basis of hours worked on the requirement side; including physician-productivity factors in requirements instead of supply; having Ontario graduates decide on practice location in response to relative fee levels, but having out-of-province graduates respond not to fees but only to physician-to-population ratios. These problems were attributable not to the methodology, but to the technical skill applied to the methodology. They are therefore not inevitable; rather, they reflect insufficient care and attention in modelling and analysis.

Third, we have tried to show that there are generally a variety of data sets from which to select the actual values entered into the estimations, and that these values are often quite different. The most glaring example in this instance was the hours-of-work data that had such a significant influence on the final requirement outcomes. The response to such uncertainty should be to shy away from point values and use sensitivity analysis and a range of values. The Task Force made very poor use of such sensitivity analyses – they were used only on some of the influences on supply and on the future of female productivity relative to male. Without these sensitivity analyses the final validity of the projected ranges is difficult if not impossible to assess.

The Task Force recognized many of the difficulties inherent in its approach; indeed, it lists what it sees as its assumptions (p. 35). It had actually to perform the quantified estimates; we have had the distinct advantage of being able to start where it left off and of not having to produce our own quantified estimates. Nevertheless, our review suggests that the estimates arrived at by the Task Force contribute little, and are, in fact, misleading.

5

The wider view: policy formulation and the Macdonald Report

The failure of the Task Force to place physician-manpower planning in the broader context of health-services resource planning renders its recommendations of dubious relevance to the policy environment that was the catalyst for the exercise, i.e., cost-effective evolution of the health care system. The Task Force's conclusions of future shortages unfortunately orient its policy discussion toward supply-enhancement measures, whereas current policy concerns centre on supply moderation or reduction. Conclusions on the geographic distribution of physicians fail to specify the size and nature of the problem (or even whether there is a problem), and do not suggest alternatives to current policy. Advice to maintain the size of the current postgraduate establishment was premised on erroneously calculated figures that, when recalculated, indicate no difficulty with the Minister's originally proposed cuts. The recommendation to do further study on the physician-requirement-reducing potential of nurse practitioners and prepaid group practice did not recognize the already proved worth of these innovations and the need, therefore, for studies not on their potential but on the barriers to implementing that potential. The policy recommendations do not take account of which policy levers are readily available to provincial governments, and they also fail to answer the central question: What will be our future need for physicians if we take advantage of at least what we currently know about how to use them efficiently?

INTRODUCTION

Policy formulation in physician-requirement exercises should take place under two headings: first, policies that relate to the question of how to organize the health-care system to attain optimal effectiveness and efficiency and thus how and in what roles physicians will be deployed in that system; second, policies to address the question of what to do about maintaining, adding to, or subtracting from the current practising stock of physicians, which will inevitably be much influenced by the policy recommendations under the first heading.

Framing policy formulation in this sequence underlines the need to recognize that physician-manpower planning is but one part of broader health-resources planning; a recognition that, with the possible exception of GMENAC (United States 1980), has not occurred in recent physician-requirement exercises. Previous Canadian endeavours have not only focused on physician requirements in isolation, but they have also been performed almost exclusively by physician panels (although the Macdonald Report marked a first move toward inter-disciplinary panels in Canada), making it all the more unlikely that the broader health-resource issues would be incorporated in anything but a cursory fashion. Thus, the National Committee (Canada 1975) stated in its outline that 'extended use of allied health professionals' should characterize the future health-delivery system; but nowhere in the working group's report is this factor taken into account. The consequence has been that any initiatives in deployment of nonphysician resources (whether personnel or organizational arrangements) have been bounded and limited by the independently made decisions that have guaranteed an increasing physician supply. When GMENAC embedded physician-manpower planning in a limited attempt at health-resource planning, it arrived at an unequivocal conclusion of physician over-supply.

The Macdonald Report was no exception to this omission. This is especially disappointing given that a major motivating factor in the creation of the Macdonald Task Force was the relationship between the number of physicians and health-care costs, and that its terms of reference made explicit the policy goal of cost-effective evolution of the health-care system. It is therefore unsatisfactory that at the conclusion of this exercise by the senior advisory body to the Minister of Health these health-resource planning issues were still considered to be in the category of 'next steps'. Although we recognize that to 'identify and examine several different health care delivery arrangements with a view to determining which offers the optimal balance of efficiency and effectiveness' (p. 13) is an unenviably complex task, the Task Force and Council, in excluding context factors from their physician-manpower model, appear to have abdicated their responsibility.

A fully detailed blueprint for a reformed health-care system is not and was not available; however, the key characteristics and broad parameters of the most likely revisions were known. Indeed, they were identified by Council in its list of context factors (p. 6), and were reviewed and discussed by the Task Force in Chapter IV. The Task Force itself offered simulation of various organization and financing scenarios as one methodologic alternative. Furthermore, it would seem to have been well within the terms of reference (and the capability and intent of its simulations) for the Task Force to have attempted to explore what impact the different scenarios and their attendant manpower requirements might have on the utilization and cost of physician services. At best, such an exercise would have provided a view of alternative futures that could be constructed, against which the effort, cost, and difficulty of constructing them could be weighed, and appropriate policies formulated. At the very least, it would have been a significant opportunity to widen and inform the discussion of medical-manpower policy as it relates to the health-care-system goals of effectiveness and efficiency.

Throughout the Council's (as opposed to the Task Force's) discussion of the issue, there are calls for a long-range plan for the Ontario health-care system, 'an explicit health strategy for Ontario' (p. 12), before exploration of medical-manpower policy options that involve changes to current delivery arrangements. This stems from the Council's position that medical-manpower policy should be 'subservient to larger overriding health policies' (p. 11). Although sounding and emphasizing the call for a plan is commendable, the prohibition of medical-manpower policy-development work in the absence of a plan is not. Even in the absence of a fully detailed long-range health plan, which we sadly agree Ontario is lacking, the government had clearly enunciated and communicated to Council at least one major policy objective – that of cost-effective evolution of the health care system. It seems inconsistent on the part of Council to have included this in the terms of reference of the Task Force, but later (p. 10) to have directed the Task Force away from its serious exploration.

Finally, on a broader level, it seems important to note that, in policy-development exercises, assuming that the status quo will prevail increases the probability that it does prevail. When the results of models such as the one employed by the Task Force are discussed in policy environments, too often the simplifying or restricting assumptions are forgotten. Discussion proceeds within one scenario, that which was quantified, rather than upon a range of scenarios as the Task Force had once envisioned.

This is amply demonstrated by an example from the Task Force's own recommendations. In the absence of the first crucial health-resource planning step in policy formulation, it proceeded immediately to policies for modifications to the current physician stock with only the results from its limited quantitative model for guidance. These results indicated a future physician shortage, and (erroneously as it turns out – see Postgraduate Medical Education section below) a severe shortage, should proposed cutbacks in postgraduate residency posts be implemented. Consequently, the policy discussion of the 'supply control' area centres not on supply control at all, but on how to enhance current supply to meet the expected shortage!

The remainder of this chapter analyses these isolated medical-manpower policy recommendations of the Task Force. Medical-manpower policies were prescribed in the areas of geographic distribution of physicians, postgraduate medical education, supply control, utilization modification, and data requirements. We analyse whether the Task Force's recommendations in these areas flow naturally from its own analysis, and assess the relevance or importance of its policy prescriptions, given the absence of any broad health-resource planning policies, and the current concerns in the area of medical-manpower policy.

GEOGRAPHIC DISTRIBUTION OF PHYSICIANS

The Task Force's recommendations were:

> - to evaluate government-sponsored and university-sponsored programs in Northern Ontario including the Underserviced Area Program and other manpower-related educational and service programs with a view to coordinating and improving the effectiveness of these programs;
> - to create and maintain a data base in order to monitor the distribution of physicians' services in Ontario. (p. 56)

In the discussion of geographic distribution, we could discern no meaningful proposals other than the view that current programs should be evaluated (p. 46). Given the Task Force's failure to cite any evidence that a problem even exists in the geographic distribution of physicians, it would seem premature to recommend program evaluation. Policies directed toward physician maldistribution should be premised first on the demonstration of whether, where, what types of, by how much, and for whom physicians are not available. Only then should programs be assessed (in fact, only then should programs be introduced) for their effectiveness in alleviating the specific access problems that are known to be present. Presumably the Task Force recommended creation of the data base to perform this function 'after the fact'. Given the utilization framework of the report, however, it would not have been difficult for the Task Force to look itself at age-sex adjusted physician-utilization rates by specialty across Ontario's areas (Barer and Wong Fung 1985). If variations in per capita utilization existed that could not be explained by other population-related factors, then evidence of maldistribution of physicians' services would have been present. In contrast, the fact that physician-to-population ratios are unequal across areas does not necessarily imply shortage (Barer, Wong Fung, and Hsu 1984).

If the Task Force had then adopted the assumption (found throughout the report) that all utilization was necessary utilization, it could have proceeded to evaluate the success of current policies (e.g., Underserviced Area Program) in redressing the specific utilization imbalances that had been disclosed and/or it could have suggested alternative policies. The Task Force chose not to perform these calculations, however. What was left, therefore, was a description of current programs for underserviced areas (which appear to have no explicit policy objectives), and neither the data nor the policy alternatives against which to judge them.

Therefore, the limited content of the Task Force's chapter on physician geographic distribution leaves us with few implications to discuss. We would note, however, that the central policy question in this area, although fundamental, has yet to be answered satisfactorily, i.e., what is and how shall we define an 'underserviced area'? Attempts to date to validate the designation criteria used by governments for such areas have not been successful (Kleinman and Wilson 1977; Kehrer and Woolridge 1983; Kviz and Flaskerud 1984).

The Task Force's recommendation is:

> – to make no further reductions in Ministry of Health funded places for interns and residents beyond those scheduled for 1983. (p. 56)

The initial mandate of the Task Force (Phase I) had been to comment on the Minister of Health's policy proposal to reduce the number of slots available each year for interns and residents from 2,502 in 1982 to 2,077 in 1985. Without the benefit of the detailed supply and demand projections of Phase II, the Task Force had concluded that there was 'no cause to reject the Minister's proposed total reduction' (p. 50).

This conclusion was re-examined in Phase II, with the 'benefit' of a range of expected demand for physicians against which to judge the adequacy of the projected physician-supply figures resulting from the proposed intern and residency reductions. First the Task Force defined its policy asssumptions:

a) Ontario should be self-sufficient in total numbers of physicians.

b) In addition, Ontario should continue to meet its current obligation to provide specialist training for other provinces.

c) Seventy full-time-equivalent interns would move into practice each year after only one year of training.

d) Only 34.6 per cent of the postgraduate establishment would locate in Ontario.[18]

e) There would be no movement of physicians in or out of the province, i.e., no immigration or emigration.

It then performed calculations to arrive at the supply in 2001 that would result from those assumptions coupled with, first, the fully implemented cuts, and, second, only partially implemented cuts in postgraduate numbers (Table 18, p. 79). The supply in these two scenarios was then compared to the range of expected demand in 2001 and found, in the first scenario, to be below the expected range and, in the second scenario, to be within the range. The Task Force therefore concluded that only partial cuts should take place (125 places instead of 425).

Although the procedure adopted by the Task Force to arrive at this conclusion was quite appropriate, the calculations were not. The Task Force continued to use an aggregated attrition figure of 2.74 per cent, thereby, contrary to its assumptions (e above), *including emigration* of physicians in the final supply (while *excluding immigration*). By including the subtraction effect of emigration but excluding the addition effect of immigration, final supply figures were gross underestimates. Table 3 documents the Task Force's calculations alongside our own re-calculations, which are based on two alternative attrition figures (1.465 per cent or 1.823 per cent) drawn from separate data sources. Full explanation of these revisions is provided as notes to the table. With full implementation of the proposed reductions, the Task Force estimated supply in 2001 to be 12,962; our re-calculations estimate that same supply as being between 15,782 and 16,982, i.e., more than 20 per cent higher, even at the low end of the range. The same degree of underestimation is present in the partial implementation scenario.

Comparison of these revised ranges of physician supply in 2001 with the range of expected 'demand' in 2001 would have resulted in a very different conclusion for the Task Force. The 'demand range' is 13,542 to 16,552 physicians; the 'supply range', with full implementation of reductions, is 15,782 to 16,982 physicians – more than enough physicians to meet even the highest expectations of 'demand'. It is clear, therefore, that the Task Force's final recommendation that the Minister of Health 'make no further reductions in Ministry of Health funded places for interns and residents beyond those scheduled for 1983 [125 places]' (p. 56) does not follow from the data and, if it were adopted, could lead to a future surplus of physicians (as defined by Task Force criteria).

This finding makes it all the more disturbing to recall that not only was the policy of no further reductions adopted by the Minister of Health, but that the already-cut 125 places were reinstated[19] before the Task Force had even completed its report! The implication is that current policies for the size of the postgraduate establishment in Ontario will likely result in larger yearly additions to the existing physician stock than is desirable.

TABLE 3

Effect of size of postgraduate establishment on supply of physicians in 2001: revision of Table 18 (p. 79) (Macdonald Report) to remove the effects of emigration that were included in Task Force's calculations (for task force's assumptions, see its table)

Calculation	Full implementation of proposed reductions by 1985			Implementation of reductions to 1983		
	Task force figures[a]	Our figures (a)[b]	Our figures (b)[c]	Task force figures[a]	Our figures (a)[b]	Our figures (b)[c]
Size of postgraduate establishment in 1985	2,077	same	same	2,327	same	same
Minus						
Number of interns (659), equals	1,418	same	same	1,668	same	same
Minus						
Obligation to other provinces (119), equals	1,299	same	same	1,549	same	same
Times						
Adjustment factor for annual physician output to be expected from this postgraduate establishment (652/1,880 or 0.34681), equals	450	same	same	537	same	same
Times						
Conversion factor to full-time-equivalent (11,016/15,663 or 0.7), equals	315	same	same	376	same	same
Plus						
Asumption that 70 FTE interns go directly into practice, equals	385	same	same	446	same	same
Minus						
Number lost to attrition (Task Force includes deaths, retirements, *and* emigration. Our figures used two alternative estimates of attrition *excluding* emigration. See notes.)	(302)	(161)	(101)	(302)	(161)	(101)

TABLE 3 (continued)

Calculation	Full implementation of proposed reductions by 1985			Implementation of reductions to 1983		
	Task force figures[a]	Our figures (a)[b]	Our figures (b)[c]	Task force figures[a]	Our figures (a)[b]	Our figures (b)[c]
Equals						
Annual additions to physician supply	83	224	284	144	285	345
Times						
16 years (2001-1985), equals	1,328	3,584	4,544	2,304	4,560	5,520
Plus						
Number of physicians added between 1981 and 1984 (Again, Task Force includes emigration attrition; our figures exclude.)	618	1,182	1,422	648	1,212	1,452
Plus						
Number of FTE physicians in 1980 (11,016)	...	...	...	...	...	...
Equals						
Number of FTE physicians supplied in 2001	12,962	15,782	16,982	13,968	16,788	17,988

[a] The Task Force assumed that yearly attrition from the stock of physicians would be equal to the number produced by applying its attrition rate of 2.74 per cent to the 1980 CPSO registry stock, i.e., 302 physicians per year. Unfortunately, the 2.74 per cent figure includes deaths, retirements, *and* emigration; the last was supposed to have been assumed away, given the wording in Table 18: 'as if ... there was no immigration or emigration of physicians' (p. 79).

[b] This column disaggregates deaths and retirements from emigration using disaggregated attrition figures provided in the Task Force's report (Table 10, 137). The average annual percentage of CPSO stock emigrating between 1977 and 1980 (1.275 per cent) was subtracted from the assumed attrition rate of 2.74 per cent to produce a deaths and retirements attrition of 1.465 per cent. Applying this to the 1980 CPSO registry stock, we obtain a subtractions figure of 161 physicians per year.

[c] This column disaggregates deaths and retirements from emigration using the annual average of the actual numbers of emigrants expressed as a percentage of CPSO registry stock for 1981, 1982, and 1983. The annual emigrant numbers were

TABLE 3 (continued)

obtained from Health and Welfare (Canada, 1984a; Canada, 1984b), and CPSO registry stock figures were drawn from the Task Force Report (Table 4, 65). These calculations, outlined below, produce an annual emigration rate of 1.823 per cent, which, when subtracted from the 2.74 per cent total attrition rate, leaves a deaths and retirements attrition of 0.917 per cent. Applying this to the 1980 CPSO registry stock, we obtain a subtractions figure of 101 physicians per year.

Annual emigration rate (1981-1983) using Health and Welfare numbers for Ontario:

	Emigration to other countries (1)	Emigration to other provinces (2)	Total emigration (3)	CPSO stock (4)	Emigration rate (3)/(4)
1981	144	122	266	15,663	1.698%
1982	189	133	322	15,992	2.014%
1983	139	146	285	16,221	1.757%
Average annual rate (1981-83)					1.823%

SOURCES: Canada (1984a) *Interprovincial Migration of Physicians during 1983* (Ottawa: Health and Welfare Canada)
Canada (1984b) *Active Civilian Physicians Who Moved Abroad, 1975-1983* (Ottawa: Health and Welfare Canada)

The Task Force's recommendations are:

> – to maintain a balance between supply of full-time equivalent physicians and the demand for their services;
>
> – to maintain the current policy regarding the size of medical school enrolment in Ontario by keeping the number of graduates at 606 per year;
>
> – to monitor the entry of physicians from outside Ontario and limit or open up immigration from other countries according to the demand for medical manpower;
>
> – to not interfere further in policies affecting supply of physicians until there is clear evidence that the supply will not meet the demand or that it will exceed the demand. (pp. 55-6)

The Task Force outlined what it saw as the government's options for controlling the supply of physicians. It is perhaps these sections of the report (pp. 29-39, 53) that could have yielded the most valuable recommendations. Given the findings of its quantitative analysis (a potential future physician shortage) and its assumed continuance of existing delivery arrangements, however, the opportunity slipped past. Analysis in the Report is premised on a need for supply enhancement, whereas current policy concerns and more enlightened quantitative analysis point to supply control. The discussion centres on five *types* of policy options (although the Task Force made them five specific options) directed at:

a) medical-school enrolment;
b) postgraduate training;
c) practising physicians,
d) immigration, and
e) combinations of the above.

Adjustments in medical-school class size or postgraduate training places were rejected as effective measures for influencing the supply of physicians because 'the projection model is relatively insensitive to the size of the graduating classes' (p. 29), and because of the inaccurate calculations regarding the effect of reducing postgraduate training places. In just a few short words, the Task Force discarded what are conceivably the government's most readily available policy levers; the conclusion therefore deserves close scrutiny. Despite the many caveats that the Task Force placed on the generalizability of its supply model, it is willing to leap from a hypothetical finding in the model: 'A reduction in class size of 15% over 20 years would result in a reduction in supply ... of only 2.2% in 2001' (p. 29), to a conclusion for the future health care system. We have already noted in Chapter 4 that the structure of the model left immigration of physicians to Ontario largely responding to the physician-to-population ratio in the province, which would clearly drop with decreased class size, thereby resulting in an influx of immigrants that would partially outweigh the effect of the class-size reduction. Alteration of this questionable assumption on the determinants of immigration in the model could well increase the apparent effectiveness of policies directed at medical-school enrolment.

Additionally, the Task Force should have noted that its twenty-year forecast period is not long enough to allow the full potential of this type of policy to become evident. Reduced class size should not be rejected as a policy in the 1980s just because its effects will not be evident until the 21st century – manpower planning requires preventive or pre-emptive action on behalf of the present *and* the next generation. It is ironic to note that altering the numbers entering medical school proved to be an effective policy for increasing the supply of physicians; therefore, we see no reason why such a policy could not contribute at least as significantly, should it be required, to moderating or even reducing the supply of physicians – albeit further in the future than might be desirable for current decision-makers.

The overly cautious dismissal of reduced medical-school enrolment as a policy lever appears doubly cautious when the potential effect of immigration on supply is examined. If immigration is an effective policy lever, then it is surely because it is easier to open up the borders to encourage immigration than it is to close borders to prevent it. If enrolment is reduced too far, however, increased immigration can then be used as a viable policy. The Task Force concludes that 'the supply of physicians is highly sensitive to this [immigration] variable' (p. 29). Then the discussion focuses on a number of ways of preventing immigration before concluding that 'none however is without difficulty' (p. 30). It did not appear to occur to the Task Force that the optimal policy approach might therefore be to err on the side of reduced medical-school enrolment, knowing that compensatory adjustments can easily be made by increasing immigration. Instead, it seems to suggest maintaining medical-school enrolment now and only later grappling with such immigration-prevention problems as how to remain within constitutional law[20] and nevertheless stop physicians from other provinces entering Ontario in the event of oversupply.

What is missing from the Task Force's entire discussion of these two policy areas is a recognition of which policy levers the government may pull with relative ease, and which would require extreme or unattainable strength to pull. Medical-school enrolment and the size of the postgraduate establishment are under the direct purview of the provincial government; immigration (or at least reduced immigration) is an issue that falls under the complex umbrella of federal-provincial relations.

Discussion of the final area of supply-control policy – options directed at practising physicians – raised two possibilities: manipulation of fees or issuing conditional permits to bill OHIP. Manipulation of fees, or at least raising and lowering aggregate fees, is well within the control of a provincial government. Thus, it is of interest to note that the Task Force's model predicts reduced emigration (increased supply) from raised fees and increased emigration (reduced supply) from lowered fees. The lowered-fees option is then rejected because it would (apparently) drive away Ontario graduates and 'be antithetical to the maintenance of high quality care because the best qualified doctors would be most likely to leave' (p. 29). We know of no evidence (and the Task Force cites none) to support either of these contentions. We would have preferred to see the raised-fees option rejected on the grounds that it is a particularly costly way to maintain or increase supply (the increase in fees goes not only to those physicians who would have left, but also to all those who would have stayed anyway); increased immigration would be a far less expensive alternative (if one believes a shortage is a future possibility).

Issuing conditional permits to bill OHIP was discussed by the Task Force as a potential mechanism for controlling provincial in-migration:

> Permits, for example, could be issued automatically, initially to all physicians practicing in Ontario. Thereafter permits could be available to all graduates of Ontario medical schools or postgraduate education programs. Additional permits up to the required number could be issued on a first-come-first-served basis subject to any priorities the government chose to recognize. (p. 30)

Clearly, it is also possible (if politically undesirable) to direct this mechanism to physicians who are already practising in the province by restricting the number of billing permits by area according to some defined 'need' for physicians in the area. This policy may be viewed as an 'emergency' measure, called into operation because of its relatively immediate effect, to be used when the fiscal consequences of physician oversupply move beyond the fiscal resources of a province, either because of unusual circumstances or because prior policy opportunities were ignored and the consequences are finally unavoidable. The province of British Columbia began using a version of this policy with support from the provincial medical association until recently. With the withdrawal of this support (Rich 1984), the province engineered passage of legislation that had already been introduced (but not passed) to achieve the same ends in the absence of medical-association acquiescence. However, a recent provincial Supreme Court judgement (brought down prior to passage of the requisite legislation) has called into question the constitutionality of the policy. The policy also generated significant nation-wide opposition from interns and residents (the physicians most affected by the measure), who were partially successful in proposing amendments to the recent Canada Health Act which also have the potential to outlaw the policy (Canadian Association of Interns and Residents 1984). Of course a basic difficulty with this type of policy is the determination of the exact complement of billing numbers (i.e., the number of physicians) 'needed' for an area – the same problem that exists for provincial or national manpower planning.

Thus, the discussion of supply-control policies by the Task Force fails in two important respects. First, there is no differential weighting of the policy options according to the ease with which they might be implemented by a province. Restricting medical-school and postgraduate places or manipulating fees are the only policies readily available to a provincial government acting on its own. One lesson to draw from this (noted by the Task Force) is that, 'Many aspects of medical manpower policy, depend on nationwide agreement and co-ordination for effective implementation' (p. 13).

Second, we are provided with no standard by which to determine adequate supply. The recommendation of the Task Force that we 'maintain a balance between supply of full-time equivalent physicians and the demand for their services' is not much help. If by 'demand' in this context the Task Force means demand that is synonymous somehow with need (inappropriate and unnecessary aspects of demand have been removed), then the recommendation is merely a platitude and can be accepted as such. If, however, demand is interpreted in the same way as it is used throughout the report (i.e., utilization), then the recommendation is tautological and is making the unexciting statement that there should be enough physicians to supply the services that physicians are supplying! Supply should surely be tuned to the 'need' for physicians; but the Task Force, having rejected the need-based approach, provides us with no assistance in relating supply control to need.

Finally, it is implicit in the Task Force's recommendations that it favours a conservative approach to supply control, avoiding it unless there is 'clear evidence that the supply will not meet demand or that it will exceed demand'. This amounts in practice to a greater willingness to err on the costly side of oversupply than undersupply. Throughout the Task Force's (and our) discussion of supply-control policies it was evident that policies to increase supply in the future were far more easily implemented than policies to reduce future supply. This would indicate to us that the more appropriate approach to supply-control policies would be to err, if one is to err at all, on the side of undersupply, i.e., to introduce supply control earlier rather than later. Ginzberg (1983) has described this as maintaining a 'taut' rather than 'slack' supply of physicians and, additionally, has pointed out that there may in some instances be increased potential for innovation with a taut supply. We discuss this further in the next section.

MODIFYING THE ORGANIZATION OF SERVICE DELIVERY

The Task Force's recommendations are:

> – to explore the potential to increase physician productivity through policies such as those that would provide more effective use of allied health personnel and the development of multi-plan delivery systems based on prepayment and group practice;
>
> – to modify projections of demand in the event that the Ontario health-care system is substantively modified. (p. 56)

The discussion of reorganization is (or should be) of a different nature from the other policy areas in this Report. In control of post-graduate medical education or physician supply, the policy initiatives are directed specifically toward the physician stock, and effects on other aspects of the system such as hospitalization, or costs of care, or the roles of other health professionals are, in a sense, only secondary (although these effects may still be significant). Initiatives directed at modifications to the health care delivery system, however, are painted with broader brush strokes. Their effects on the physician stock are undeniable and significant; but they have equally profound effects for levels of hospitalization, general cost-effectiveness of the system, expected roles of non-physician health care personnel, and so on. Thus, reorganization policy initiatives have the connotation of 'significant reform' of the health care system, and it is perhaps for this reason that the Task Force treated the area so coyly and shied away from either quantitative consideration of its effects or clear recommendations on policies.

We have already pointed out how the Task Force, by treating this area so cautiously, side-stepped both the terms of reference and intent of its mandate. Here, we would like to emphasize two further points – the advanced understanding of the effects of reorganization on health services utilization, and the interdependence of physician-manpower policy and restructuring initiatives.

The two areas most often cited as having significant potential to increase the productivity of the system are prepaid group practice and allied health personnel. The Task Force assessment is no different from other reports in this regard.

We would note, however, that neither of these innovations is a radical qualitative departure from Ontario's current health-care system. We have in Ontario, and have had since the inception of Medicare, a number of prepaid group practices operating in just the way envisaged by the Task Force and other commentators (Lomas 1985). There are currently eighteen Health Service Organizations serving over 150,000 people in the province. Evaluations have been performed (Hastings et al. 1973; Mott, Hastings, and Barclay 1973; Barer 1981), and, recently, their more efficient use of physicians has been documented (Lomas and Cushman 1984). Similarly, allied health personnel (at least in the form of nurse practitioners) have, during the 1970s, been produced in large numbers in Ontario. Although nurse-practitioner production has fallen off more recently (Spitzer 1984), it has not been for lack of evidence on their effectiveness (Spitzer et al. 1974; Chambers et al. 1977), cost-saving potential (Denton et al. 1983), and physician-replacement value (Lomas and Stoddart 1982b, 1985). Furthermore, a number of the eighteen prepaid group practices (and other fee-for-service practices) make widespread use of nurse practitioners in Ontario.

Considered in this light, the Task Force's recommendation to 'explore the potential' of these initiatives appears far too tentative. Their potential has been well explored, their limited introduction has been accomplished, and their value as factors that will modify the utilization of physicians is proved. What is now required is an analysis of the implementation barriers to more widespread implementation within Ontario's health-care system, and some clear recommendations on policies to circumvent those barriers.

Part of the analysis of implementation barriers would likely reveal that previous manpower policies have not been neutral in their effect on these innovations. There is an interdependence between manpower policies and broader system innovation. For instance, at the same time that Ontario was introducing nurse-practitioner training programs, it failed to effect a concomitant reduction in output of general practitioners from its medical schools; it was, in fact, concurrently increasing the production of physicians. In its entire discussion of utilization-modification factors, the Task Force fails to recognize this interdependence. Its recommendations reflect this omission. By recommending that we 'not interfere further in policies affecting supply of physicians until there is clear evidence that the supply will not meet the demand or that it will exceed the demand' (p. 56), it is stacking the deck significantly against any innovation that might reduce the requirement for physicians, but that nevertheless is dependent on a reduced supply of physicians before implementation can be justified. It is the Report's restricted focus on demand and utilization rather than on need that generates this circularity. The recommendation is also a rather predictable corollary to the Report's tendency to extend the status quo.

As noted above, Ginzberg (1983) has noted that a taut (under-) supply of physicians may well make it easier to sell and implement change, whereas a slack (over-) supply will act as a barrier. The likelihood and the timing of innovation are, themselves, functions of supply.[21] This once again points to the importance of embedding physician-manpower planning within the broader health-resource planning context.

The announcement in 1982 that the government wanted to single out one of the initiatives – Health Service Organizations – for a more significant future role in Ontario (L. Grossman 1982) makes the Task Force's weak recommendations in the area all the more inappropriate. This, and other factors with demonstrated worth in reducing the utilization of physicians' services while leaving health status unaffected, should surely be the very kernel of policy exercises and policy recommendations on the future requirements for physicians. The Task Force Report represents a rare opportunity forgone.

DATA REQUIREMENTS

The Task Force's recommendations are:

> – to improve and maintain a data base to provide information on the supply of and requirements for medical manpower;
>
> – to maintain a simulation model in order to monitor and adjust policy regarding the balance between the supply of and demand for medical manpower. (p. 56)

The need for better and more timely data on physician manpower has been pointed out frequently in both Ontario and Canada (Moore 1982; Woods 1983; Barer, Wong Fung, and Hsu 1984; Lomas, Stoddart, and Barer 1985). In fact, it has become an almost mandatory observation for any investigation in the area. In this regard, the data recommendations of the Macdonald Task Force are neither controversial nor arguable. We currently have extremely poor information on the career paths of physicians, retirement ages, hours of work, locational preferences, and even on absolute numbers of practising physicians. Both the Canadian Medical Association and Health and Welfare Canada have started the process of improving basic data banks; but we are still seriously lacking research studies that relate these cross-sectional data to the behaviour of cohorts of physicians over time. Without such research studies, manpower planning will continue to be plagued by dubious estimations of future physician behaviour, viz. the hours-of-work assumptions in the Task Force's calculations.

Although one would not want to argue with the basic thrust of the Task Force's data recommendations, it is important to point out that data banks must provide comprehensive and accurate information on supply and requirements, and simulations should have clear conceptual models and incorporate appropriate assumptions about future health-system structure – the wrong data and unsupported assumptions built into a simulation model may be more harmful than no data or no simulation model. The simulation model used by the Task Force, if it were viewed as the end of the process rather than merely the first step in a sequential modelling process, could easily do more harm than good. Thus, we would have been happier to see the Task Force's recommendation for a simulation model couched in terms of supply and requirement rather than of supply and demand. Beyond this, we would hope that finally governments will respond to the recurring request for more and better data by both collating some themselves and making available the funds for others to collate data and perform the necessary research studies. Alongside the dollars spent on medical and other health care in Ontario, research aimed at monitoring and evaluating those expenditures is almost non-existent.

CONCLUSIONS

Clearly there are many strands in the complex web of medical-manpower planning. Perhaps the central question, however, is whether the physician supply should be determined by, or will be allowed by default to determine, to an extent, the structure of the health care system. If physician-manpower policies are not derivative of broader policies directed at the structure of the health care system, physician supply itself will determine the structure and the (dis)-incentives to efficiency. Maintaining a slightly 'taut' supply seems clearly preferable to supporting a 'slack' supply. Among policies available to control supply, those that can compensate for an overly taut supply are more easily implemented than those that might compensate for an overly slack supply.

Although the Ontario Council of Health (1983) commented that 'medical-manpower policy should serve the system, not the other way around' (p. 10), the approach taken by the Task Force precluded any serious proposals that would alter current manpower policy. The analysis was used 'to project an extension of the *present* system (the one we know most about) and to identify requirements given *that* scenario' (p. 10). We must therefore agree with the Council that the report provides 'a reasonable base line for comparison with projections of requirements for other scenarios' (p. 10), and therefore, we would add, no basis for alterations in current manpower policies. Because the report is grounded in a continuation of the status quo, it cannot be used as a guide to generate manpower policies that might aid in the 'cost-effective evolution of the health system'. The recommendations seem to be answering a question that was not asked – What should be our manpower policies to maintain the current position of physicians in the current system? – and ignoring the central question – What will be our future need for physicians if we take advantage of at least what we currently know about how to use them efficiently?

The Task Force's report was perhaps an adequate (but small) first step, the value of which is in giving us some idea of where we might end up if we continue with present policies. We have already had the benefit of a number of such studies in Ontario (OCH 1974; COFM 1975; COFM 1981), however, and it is perhaps time now that we took on the more challenging and less tractable task of answering the central question noted above, and adjusting our physician-manpower policies to bring them in line with broader health-resource deployment policies.

6

The final view: lessons from the Macdonald Report

The foregoing detailed analysis of the Macdonald Report reveals a number of lessons for future physician-manpower planning in Ontario. These lessons are of two distinct types: methodologic lessons on the actual conduct of manpower-planning exercises, and policy lessons on the preconditions for and use of the results from such exercises.

METHODOLOGIC LESSONS

Our analysis of the Macdonald Report yields seven important methodologic lessons for future physician-manpower 'planning' exercises:

1 Consistent and explicit rules should be applied to decide what constitutes an adequate data set for inclusion as a change factor in quantification estimates of future physician requirements; selective quantification of only those factors giving rise to increased requirements is an undesirable and avoidable source of bias.

In the Macdonald exercise, the only change factors used in quantified work were those that increased future physician requirements – population growth and changed age-sex mix on the requirements side, and reduced hours of work (in total or because of changed sex composition of the stock) on the supply side. The data upon which these estimates were based were certainly no more reliable, and in the case of work hours were probably less reliable, than available data on potential requirement-reducing factors such as nurse-practitioners or health-service organizations. By setting explicit criteria for inclusion of data sets at the start of an exercise, this 'selective quantification' would be avoided.

2 Where uncertainty exists concerning specific data values or assumptions about future changes, ranges of values (rather than point estimates) should be entered into sensitivity analyses.

Because conclusions and policy formulation tend to be premised on the results of the quantified estimations of planning exercises (and therefore ignore caveats placed on and assumptions inherent in the use of specific data values), the constituent and final numbers should not be point estimates that imply greater certainty than actually exists. Ranges of values, with note taken of which assumptions give rise to the limits of the range, should be presented.

3 Physician productivity should not be measured simply by hours worked but by either the real output of effective health care services per hour of physician work time or, ideally (but unrealistically), by the impact on health status per hour of physician work time.

By focusing on only the actual work hours as a measure of physicians' contribution to the supply of health care services, the Macdonald Report ignored the potential variation between physicians in how the content of those work hours actually contributes to the population's health. This orientation by the Task Force was very much a consequence of its focus on utilization data, i.e., acceptance of the current level of service provision as required.

4 A clear distinction must be maintained between the need-based, demand-based, and utilization-based approaches to physician-requirements planning, keeping in mind the different policy implications and measurement imperatives of each approach.

By adopting the utilization-based (not, as stated, the demand-based) approach to its exercise, the Macdonald Task Force accepted that not only all the services currently provided were indeed required but, furthermore, that they would continue to be required in the future. Thus, for example, despite the fact that the aging population is partly a consequence of an increasingly healthy population, the Task Force assumed that the elderly in the future would require the same level of health care services as the elderly do at present. The policy implication of the utilization approach, missed by the Task Force, is that the nature and quantity of current per capita health care services should not be reduced in the future. The demand-based approach implies policies that respond to a health-service requirement premised on patient-initiated encounters and, given the degree to which health services are in fact often physician-initiated, may have no practical application in our planning exercises. Need-based approaches quantify the actual epidemiologic requirements taking into account which health-service requirements can be effectively addressed by physicians' services. The policy implication of this latter approach is a physician-requirement calculation premised on the provision of necessary and *effective* health care services. The failure of the Macdonald Task Force (and previous Canadian exercises) to understand and make these important distinctions resulted in its drawing out inappropriate and confusing relationships between its quantitative exercise and its policy conclusions.

5 A distinction must be made between health-service requirements and physician requirements. If efficient allocation of health-care resources is a policy objective, then physicians must be viewed as only one of an available array of provider resources.

Whatever approach is adopted for the calculation of future requirements, it should be remembered that the requirement is for effective health care *services*, not for specific types of health care professionals, physicians included. Although certain services may uniquely correspond to certain professionals (or facilities and equipment), most do not. Maintenance of this distinction is essential if planners are to incorporate efficiency considerations into physician-manpower planning exercises.

6 Current levels of service provision (utilization) should not be used to project future service requirements without modifications to the data to take account of at least some of the known ineffective or unnecessary servicing patterns and inefficiencies in service provision. More important, both the theoretic approach (need versus demand) and the measurement methods employed for estimation of future service requirements should be considered independently of assumptions about future arrangements for organizing, financing, and delivering required services.

As the Macdonald Report notes, the expense and difficulty associated with methodologically elegant need-based approaches are often formidable; however, even if measurement methods employ utilization data for practical purposes, effort should be made to adjust these data to the extent possible to conform to a need-based approach. Failure to do so constitutes implicit, if not explicit, rejection of the most appropriate framework for planning. Furthermore, the view that need-based estimation of service requirements cannot be implemented without exact knowledge of future delivery arrangements and policies is erroneous and can contribute, as it did in the Macdonald Report, to unjustified rejection of the need-based approach. Decisions about which services are or will be needed, and in what amounts, are logically distinct from decisions about how to organize, finance, and provide those services. Thus, service requirements and the structure of the health-care delivery system, although they are related in a very specific way – the latter to be decided upon in response to the former – are two separate elements of any manpower-planning exercise.

7 The notion of an overall resource or expenditure constraint is an integral and essential component of any manpower-planning exercise that purports to address the linkage between a physician-centred health-care system and the cost-effective evolution of that system.

The capacity of any health-care system to meet need or demand is bounded not only by existing knowledge but also by society's ability and willingness to commit scarce resources to health care instead of other activities. Although our society places a high priority on health, it does not pursue health at all costs. Even if not by explicit, obvious, or easily observable means, we clearly place a resource constraint on the health-care system. There may be some elasticity in the constraint, and the constraint may be revised from time to time, but there is a constraint. To ignore it, and the stimulus to efficiency that it provides, in the methodologic structure of manpower-planning exercises significantly reduces the policy relevance of such exercises, as the Macdonald Task Force learned (we trust).

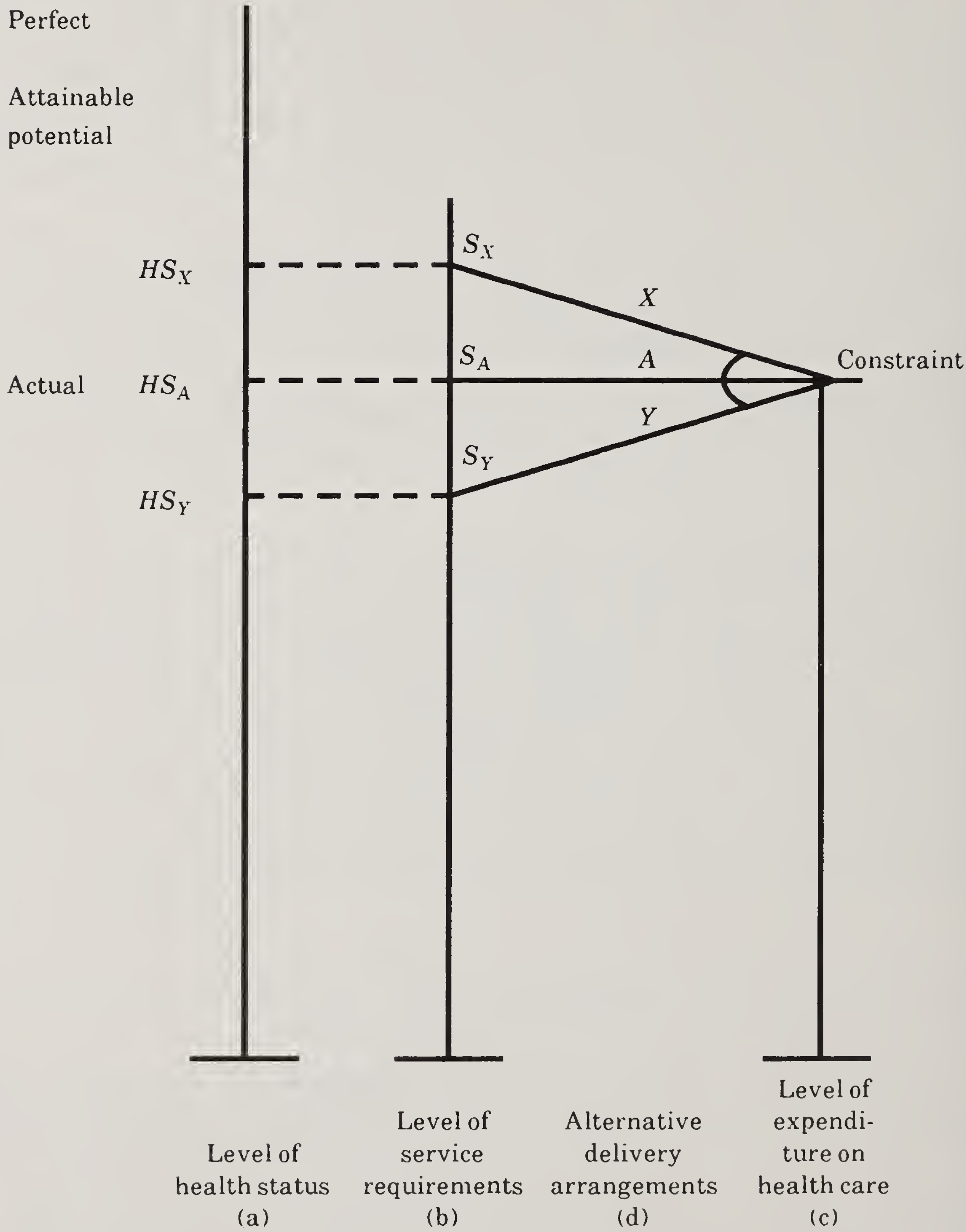
The methodologic lessons are summarized in Figure 4, which depicts what we believe to be an appropriate conceptual framework for physician-manpower planning. The framework illustrates the relationship between need-based requirements estimation and cost-effective supply of health care services by separating the elements of need assessment, service requirements, expenditure constraints, and alternative delivery arrangements in the following manner:

a) Need, an epidemiologic concept, refers to the services that would be required to maintain existing health status and to remedy the deficit between the actual and the potential health status of a population, given the incidence of disease and conditions adversely affecting health, and existing knowledge of effective 'treatments' for those diseases and conditions. It is important to realize, however, that potential health status does not mean perfect health status, but rather attainable health status given existing knowledge of effective interventions. Thus, some needs must remain unmet, at least for the present, until research raises the level of attainable potential.[22]

b) Levels of health status up to 'attainable potential' in Figure 4 generate the need for health services that is referred to in the second column of the figure as 'service requirements'.

c) At any time, a resource constraint, depicted as an expenditure constraint in the fourth column of the figure, exists upon the health-care sector. The exact size of the expenditure commitment, and the process by which it is determined, although important subjects in themselves, are not central to the framework for summary purposes. The continuous challenge facing health-care planners and policy-makers is the transformation of limited health-care resources into the

FIGURE 4
A conceptual framework for physician-manpower planning


Perfect
Attainable potential
HS_X
Actual
HS_A
HS_Y
S_X
S_A
S_Y
X
A
Y
Constraint
Level of health status (a)
Level of service requirements (b)
Alternative delivery arrangements (d)
Level of expenditure on health care (c)

highest possible level of health status for the population, i.e., to meet as much of the need for effective services as possible. This view in no way denies that factors other than health care significantly affect health status (Lalonde 1974), or discourages efforts aimed at preventing or reducing need. For existing or anticipated need, however, and within the scope afforded to health services by biologic, environmental, and lifestyle factors, the health-care planning task is clearly one of constrained optimization of health.

d) A variety of health-care delivery arrangements exists to choose from in executing this task. These arrangements include not only different input mixes (i.e., different combinations of various health care professionals, facilities, and equipment), but also different mixes of organizational and financial arrangements for structuring and influencing the activities of health care professionals and institutions. Because different delivery arrangements will vary in cost and productivity, any level of expenditure is capable of meeting a range of health-service needs, with a corresponding range in its effect on health status. This is illustrated in Figure 4 by the arc defined by rays X and Y, which result in levels of service provision S_X and S_Y, and levels of health status HS_X and HS_Y, respectively. Ray X depicts the most efficient set of delivery arrangements, ray Y the least efficient. Currently existing delivery arrangements are represented by ray A, providing service level S_A and resulting in health status HS_A. This depicts a situation in which some available delivery arrangements known to be cost-effective are not currently being used. Note that each ray will have a specific physician stock associated with it and appropriate for the delivery arrangements selected. Thus, physician requirements are clearly seen to be influenced independently by need-based service requirements and the choice of delivery arrangements.

We conclude our summary of methodologic lessons with two comments. First, the framework in Figure 4 is consistent with the series of methodologic choices that confronted the Macdonald Task Force, as outlined earlier in Figure 1. Major flaws in the Macdonald Report can be traced directly to its omission, rejection, or blurring of the distinct elements in the framework presented in Figure 4.

Second, the framework of Figure 4 is not intended to describe in detail a new methodology for manpower planning, though one is much needed. It leaves unaddressed important and practical issues in the definition and measurement of health and need. It also abstracts from the difficulty and cost of implementing changes in delivery arrangements. If planning and policy development exercises do not begin by adoption of a new and clear conceptual framework, however, methodologies to deal with specific issues will not be elicited. The task for the 'next' Macdonald Task Force must be to adopt and to make operative such a framework.

POLICY LESSONS

Although the present work is first and foremost an analysis of the methodologic issues involved in physician-manpower planning (through the vehicle of the Macdonald Report), the analysis also revealed certain inescapable policy lessons. We therefore felt it worthwhile to conclude this review with a brief discussion of these lessons.

1 There is a marked asymmetry in information requirements in physician-manpower research, such that far greater certainty seems required for conclusions of a surplus than for conclusions of a shortage before appropriate policies are introduced.

The mere threat of actual or potential shortages of physicians in the 1960s generated almost immediate action on the part of governments in opening new medical schools. The evidence of future (or currrent) surplus that first emerged in the early 1970s has failed to generate such immediate closing of medical schools or, until very recently, even reductions in medical-school enrolment. This is despite the fact that we are now, as we were not in the 1960s, well aware of many means to compensate for any future shortages owing to over-zealous cut-backs (e.g., immigration, substitute personnel, or more efficient delivery mechanisms). We would contend that the evidence of physician surplus that exists today is, by the standards applied to the evidence on physician shortage in the 1960s, well beyond the point at which actions such as significant enrolment reduction or even closure of medical schools is indicated. We would also note that governments have felt compelled and able to act in the 1980s in areas with far less evidence than we currently have in support of a physician surplus.

2 In the current demographic environment (with a growing and aging population) utilization-based approaches to physician-requirement estimation that do not take account of potential modifications to the health care delivery system will almost inevitably arrive at conclusions of a future physician shortage.

With both a growing and an aging population, manpower-planning exercises (such as the Macdonald Report) that take as a starting point the imperative to provide at least the current level of per capita service (i.e., utilization-based approaches), and that are not willing or able to consider either the effectiveness of those services, or more efficient ways of delivering them, will, by definition, generate the conclusion that we require more physicians in the future. This is perhaps especially true for physician-dominated exercises that, as Bloom and Peterson (1979) have pointed out, inevitably lead to physician-manpower expansionism.

3 Planning exercises that are premised on continuance of present delivery arrangements are not policy-neutral; the consequence of adopting recommendations based on such exercises will be to continue or increase present impediments to change.

The Macdonald Task Force assumed that because it posited continuance of present delivery arrangements its deliberations represented a policy-neutral 'holding pattern'. This is not the case, because of the role of the current level of physician supply in acting as a barrier to the implementation of known effective and efficient innovations such as nurse practitioners. By assuming that nurse practitioners (or other innovations) will not be part of the future delivery system, the probability of their future inclusion is not left unaltered – it is significantly reduced.

4 The social opportunity cost of implementing the recommendations of planning exercises that take no account of potential modifications to the health care delivery system will almost certainly exceed the expense of doing a thorough need-based analysis of the health care system and implementing the resulting recommendations.

The framework presented in Figure 4 dramatizes the opportunity cost associated with the continuance of present delivery arrangements. It is the forgoing of the range $HS_A - HS_X$, however large that may be. By failing to take advantage of cost-effective delivery arrangements for providing needed services, we are in effect reducing the health status of the population to below achievable levels. Thus, the opportunity cost is ultimately measured not in wasted dollars, but in lives that could have been saved or improved. Viewed in the light of this opportunity cost, methodologic choices such as those of the Macdonald Task Force, which freeze existing delivery arrangements, are neither neutral nor innocuous. It is almost certainly the case that this opportunity cost far exceeds the cost of doing a thorough need-based analysis complete with potential modifications to the future delivery system.

5 There is no need for even more studies on the potential of prepaid group practice or nurse practitioners to reduce the requirement for physicians (or many other health-system resources); what is needed are studies on the implementation barriers to these well-proved but little-utilized innovations.

The worth of nurse practitioners and prepaid group practice in reducing the requirements for physicians is well proved. What has not been as well demonstrated is the nature of the policy, regulatory, and attitudinal changes that must take place to encourage these innovations and the impact of innovation on the affected constituencies. Without comprehensive studies of these barriers to implementation of proved innovations, we will continue to fall well short of the potential level of efficiency that could be realized for our health-care system.

6 Because the most potent current potential influence on provincial physician supply is inter-provincial migration, any policy regarding medical-school enrolments must be a joint federal-provincial policy.

Immigration of physicians from outside the country is now well under control, and therefore the two major remaining determinants of physician supply in a province are the level of enrolment in provincial medical schools and inter-provincial migration. There may be significant constitutional constraints on a province's ability to limit the flow of physicians across its borders. Therefore, although any one (or a small group of) provinces may be able to control its supply of physicians in the short run, any province-specific policies addressing primarily inter-provincial migration (e.g., British Columbia's current policy) cannot be generalized. A *national* policy on the size of medical-school enrolment is thus the only long-term solution to control of physician supply within a province. The alternative – erecting barriers in individual provinces to the free flow of physicians across (and within) provincial boundaries – will only lead to confrontation with the profession and adverse consequences for neighbouring provinces without such barriers. In this regard, the recommendations from the recently completed federal-provincial study (Canada 1984)[23] are an encouraging start.

7 No further physician-manpower studies such as the Macdonald Task Force Report should be funded until such time as physician-manpower planning is embedded in a broader exercise of health-resource planning that recognizes the current policy imperative of cost-effective evolution of the health system; funding research that, by its adopted assumptions, will generate answers that are easily determinable without the research is an ineffective and wasteful use of research/policy/planning funds.

The planning of physician requirements in isolation from our requirements for other resources in the health care system fails to address the importance of cost-effective provision of health services. This type of isolated planning exercise will ensure that we continue to allow policy choices to happen by default (as a consequence of existing financial, regulatory, or delivery arrangements), rather than making the policy choices by design. We have arrived (if we did not arrive some time ago) at a point in the development of our health-care system when it is no longer enough to guide the system gently along the well-worn tracks of the past; a concerted effort to take a new line guided by the objectives of effectiveness and efficiency is required, and changes to the physician stock are but one part of these larger objectives. By funding further utilization-based studies of physician requirements under the assumption of an unmodified delivery system, we will fail not only in the near term but also in the long term to achieve these objectives.

Notes

1 Figures are based on active civilian physicians plus interns and residents.

2 Reliable sources report that this figure of 300 is, in fact, an uncorrected typographical error, and the intended figure was one physician to 500 citizens – still a daunting physician supply!

3 Postgraduate manpower should not be confused with medical-school enrolments. The former concerns only 'graduate' physician numbers; the latter concerns undergraduate numbers. Nevertheless, the two are, of course, closely related.

4 A call that he repeated in his second report on physicians' compensation one year later.

5 Interestingly enough, this process was also carried out under the auspices of the Ontario Council of Health.

6 Again, with the exception of the Task Force's imposed values for the proportion of new Ontario graduates registering in Ontario.

7 Presumably the Task Force means 'cost-effective', or 'efficient'. The essence of the concept of efficiency is a consideration of both the costs and the effects of an activity, i.e., a comparison of inputs to outputs. Although this may seem a minor point, the loose use of concepts such as efficiency, demand, need, utilization, and productivity repeatedly leads to troublesome and inconsistent methodologic actions in this report.

8 It was somewhat disturbing to find that the Report (and ADL) refer to Lomas and Stoddart (1982a) immediately after this quote. After checking our previous article carefully, we feel confident in

pointing out to readers that the confusion of the Task Force and ADL over demand and utilization is *not* our responsibility.

9 Comprehensive reviews of pertinent literature were not documented in the Task Force Report. The Task Force quotes inappropriate references as representative of a body of literature in a number of cases. For instance, it fails to reference the extensive work of Jane Cassels-Record on the potential for physician replacement by nurse practitioners or physician assistants (Cassels-Record 1981), or the major study of the potential effect of HMOs on physician-manpower requirements done for the United States Department of Health, Education and Welfare (Geomet Inc. 1974). We find these omissions particularly troublesome given that the Task Force engaged a number of research assistants to perform literature reviews.

10 The ADL report exhibits some confusion over what it considers to be the base year. Although stating that the 1982 fiscal year was used to define dollar values for the full-time-equivalent supply definition (p. 152), the year being used in Table 1 (p. 174) is 1981/2, i.e., FY 1981. However, when the definition is actually applied to a data set (Table 2, p. 175) the base figure for full-time-equivalent supply is for 1980/1, i.e., FY 1980! And when we turn to the simulation projections (pp. 178-88) we find calendar years, not fiscal years, and the last year for which data (rather than projections) are provided is 1980. On the grounds that FY 1980 was the only year for which we could find a dual consistent reference (Table 1, p. 175, and pp. 178-88), we decided that this must have been what ADL considered the base year.

11 While the Task Force believed that there was 'no way to estimate systematically what the required numbers are for purposes other than providing care', it nevertheless accepted 'the reasoning [of ADL, presumably] that the actual numbers have been taken into account in calculating the number of FTE physicians in practice' (p. 26). Our careful scrutiny of the ADL report, however, failed to reveal any evidence that this was the case; calculations were, we think, restricted to OHIP physicians in patient care.

12 For instance, there has long been discussion of the possibility of putting the hospital-based specialties – pathology, radiology, and anaesthesia – on salary. This move would significantly alter the

relative proportions of fee-for-service and non-fee-for-service patient-care physicians.

13 In a recent validation (Moore 1982) of the GP portion of the CPSO registry, fully 33 per cent of registrants were found to have died, retired, or left the province!

14 Peat-Marwick and Partners (1982) Section III, Category 5 Reports. We find in this report the following quote:

> It should be noted that the Royal College of Physicians and Surgeons convened a meeting two years ago to review the manpower planning guidelines which had been proposed by the National Committee. The president and secretary of each of the professional associations representing the 33 specialties which were reviewed by the National Committee were present. The findings of the meeting were that, with the exception of one or two small sub-specialties, the service target ratios recommended by the National Committee had proved appropriate and were still applicable. (p. ii-iv)

15 We say 'more reliable' because (a) it was based on interviews with a randomly selected sample of physicians rather than mailed replies to a survey with a response rate of 27 per cent, and (b) it specified exactly what constituted patient care rather than leaving the individual respondents to define it arbitrarily and heterogeneously themselves.

16 On the contrary, comparison of declared hours worked in the 1978 and 1980 OMA surveys indicated increasing work hours in 11 out of 18 specialities.

17 We note that the effect of the revised hours-of-work figure on the Task Force's *current* requirement estimate is to increase it by 10 per cent to 11,815.

18 This assumption was adopted from the Low Committee's investigation of postgraduate manpower.

19 To the credit of the Minister, at least the reinstatement was used as an opportunity to attempt to redress specialty maldistribution. Posts could be reinstated only to designated specialties deemed to be in need of more residency posts because of apparent shortages in the practising physician stock.

20 Of particular concern in this context is clause 6(2)(b) of the Constitution Act (1982), which states: 'Every citizen of Canada and every person who has the status of a permanent resident of Canada has the right ... to pursue the gaining of a livelihood in any province.'

21 Although we would concur with Ginzberg in relation to the nurse-practitioner example, there is some evidence that the opposite directional effect may hold for prepaid group practices, which appear to be more 'saleable' in areas of physician oversupply (Luft 1981).

22 Of course, it is not difficult to find problems with the simple depiction in Figure 4. What is perfect health status in the presence of the Iron Law of Epidemiology that one out of one dies? Isn't need infinite if one adopts the World Health Organization's view that health status is a function of emotional and social well-being as well as physicial well-being? Do not problems of measuring health status, however defined, confound the placement of the 'actual' and 'attainable potential' lines? These are all valid questions, and there is a voluminous literature of potentially paralysing debate and discussion of these and other issues in what Williams (1978) refers to as 'needology'. With due respect to the learned contributions comprising this literature, however, these issues and problems should not preclude in practice the adoption of workable definitions and assessments of need.

In practice, there are various ways of assessing need in relation to actual and potentially attainable health status. These range from the use of sophisticated and costly epidemiologic field surveys to the acceptance of the judgements of delphi panels of experts. The recent GMENAC exercise completed in the United States, although not without its deficiencies, stands as one example of the feasibility of need-based approaches, and several important considerations in need-based methodologies are discussed by Jacoby (1978). Regardless of the specific methodology adopted, need-based approaches will inevitably involve the use of 'expert' judgment, whether it be on the definition and incidence of diseases and conditions, or more frequently the services capable of remedying them. What is critical, as Williams (1978) points out, is that the roles for the experts are carefully constructed, and that 'expertise' is confined to the role for which it is appropriate.

23 This supposedly 'confidential report' qualified (until very recently) as one of the most widely read documents never to have been released by the Department of National Health and Welfare.

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